ARITHMETICK

IN THE
Plaineſt and moſt Conciſe METHODS
hitherto Extant.

WITH
New Improvements
For the Diſpatch of BUSINESS in all the ſeveral

RULES.

AS ALSO,
FRACTIONS Vulgar and Decimal,
wrought together after a New Method, that renders
both eaſy to be underſtood in their NATURE
and USE.

The whole Perus'd and Approv'd of, by
the moſt eminent Accomptants in the ſeveral Offices
of the REVENUE, *viz. Cuſtoms, Exciſe,* &c. as the
only Book of its Kind, for Variety of RULES
and Brevity of WORK.

The TWELFTH EDITION, with conſiderable
Additions, and curious Improvements by the Author,
GEO. FISHER, Accomptant.

To this EDITION is added
An APPENDIX, not in any of the Former.

BELFAST:
Printed by and for JAMES MAGEE, at the BIBLE
and CROWN in *Bridge-ſtreet.* M,DCC,LXII.

181. g. 92

BIBLIOTHECA BODLEIANA

To the Right Worſhipful

Sir Samuel Clarke, *Knt.*

And Merchant of the Honourable

CITY of *LONDON.*

SIR,

W*HEN I conſider'd of your great Abilities and moſt conſummate Knowledge in things of this Nature, I was under great Heſitations, leſt I ſhould appear too Preſumptuous in Dedicating ſuch a Trifle to your Worſhip: But then, Sir, again conſidering, that your Candour, and obliging Condeſcenſion, was equally as great; and alſo encouraged by Favours formerly received, I have ventured to ſhelter this* Treatiſe of ARITHMETICK *under your Great Name; and if it gain but your Approbation, I ſhall not be ambitious of any other* Imprimatur; *but acquieſce with ſome Aſſurance, that the Book will meet with a favourable* *and kind Reception in the World. In this Impreſſion, I have endeavoured to be as correct as poſſible, and have made conſiderable* Additions *and* Improvements *in the ſeveral* Rules; *which, with all humble Submiſſion, encourages me to hope may in Part excuſe for my twelfth Preſumption of troubling your Worſhip; and remain with all poſſible Reſpect and Deference,*

Your Worſhip's

moſt Devoted,

and moſt Obedient

humble Servant,

GEO. FISHER.

THE PREFACE.

SOMETIME before I attempted, or had any Thoughts of compiling this Book, a very good Friend of mine, (Mr. *Wilkins*, *Ruſſia* Merchant) deſired me to draw him out ſome few Notes of the ſhorteſt Ways and Methods of Working ſome of the Rules in *Arithmetick*; which when I ſet about, endeavouring to oblige my Friend, I hit on ſeveral Things, (not thought on by me before) which I hop'd, if made publick, might be of good Service to the World.

If it be objected, that the Books on this Subject are too numerous already, I anſwer, That as many as there are extant, yet there are none ſo perfect, but there may be Improvement made upon them; and if ſo, and that thoſe Improvements may be of any conſiderable Uſe and Benefit to Mankind, why may they not be made publick?

Arithmetick (ſaith Mr. *Locke*, in his *Eſſay on human Underſtanding*) is of ſuch *general Uſe and Service*, in all the Parts of Life and Buſineſs, that ſcarce any thing is to be done without it; and therefore I think there cannot be too many, or too good Inſtructions for its Attainment: And before either *Hodder*'s, *Cocker*'s, or

Ayre's Books appeared in the World, there were many excellent Pieces of that Science then extant, and yet their Books came abroad, and found encouraging Entertainment, and they themſelves Applauſe for their Endeavours.

And if another improves as much upon them, as they did upon others before them, why may he not hope for ſome Succeſs and Approbation? In ſhort, if the Book meets with Encouragement but equal to the Author's Care and Endeavours, to make it the moſt uſeful of its Kind, he will have Reward enough.

As to the Work, I have gone thro' *Numeration*, *Addition* (with ſeveral uſeful Tables) *Subtraction*, *Multiplication* and *Diviſion*, with ſo much Plainneſs and Perſpicuity, and in ſuch familiar and pertinent Terms, that the meaneſt Capacity may underſtand them and apply them properly.

In *Multiplication* I have been more copious than ordinary, that I might ſhew the excellent Uſes that may be made of that Rule only, particularly in *Money*; where, by having the Price of one Thing, I have ſhewn how to find out the Value of many Things at that Rate: So that if a Perſon well underſtands the Methods and Intentions of the Rules and Directions therein laid down, (which are as eaſy as *Addition of Money)* if he makes no farther Advances in *Arithmetick*, yet he ſhall be able to caſt up moſt Things that ordinarily occur in common Buſineſs, with Elegancy and Expedition.

In *Diviſion* I have ſhewn the two *Italian* Ways of Dividing; and alſo ſeveral *Examples*, whereby a Sum many times may be ſooner (and in much fewer Figures) work'd at two Diviſions than at one: Likewiſe how Sums of divers Denominations, as of *Pounds*, *Shillings*,

lings, and *Pence*, &c. may be divided into equal Parts, without reducing them into the loweſt Name mentioned (as is generally the Practice) and is done in half the Time, and a quarter of the Figures us'd in the other Way. Alſo by *Diviſion* to find, having the Value of many Things, the Price of one Thing at that Rate.

In *Reduction* I have ſhewn great Variety of Working, and divers Ways of abbreviating the common Method us'd in that Rule; and how to bring *Groſs Weight* into *Pounds* without multiplying.

Next I ſhew the ſhorteſt and beſt Methods of deducting the *Tare* and *Tret*, &c.

In the *Rule of Three* I have been very full in explaining its Nature and Uſe; with two ſeveral Methods of ſhortening moſt Operations in that Rule, as is clearly evinced by ſundry Examples therein.

From thence I paſs to the *Rule Inverſe*, and exemplify it by Variety of *Rules* and *Examples*: As alſo the *Double Rule of Three Direct* and *Inverſe*, with the *Rule of Three* compoſed of the five given Numbers.

Then the ſeveral *Rules of Practice* are taught, with greater Variety and Improvements than in any one Book of *Arithmetick* hitherto extant.

As alſo the *Rule of Company*, with a Method of contracting the tedious Way of working Queſtions in that Rule.

Likewiſe *Intereſt* at all Rates, ſhewn in ſundry *Examples* variouſly wrought. With *Diſcount*, *Exchange*, *Profit* and *Loſs*.

Then I treat of *Fractions* both *Vulgar* and *Decimal*, working one with the other in ſuch a Method as renders both eaſy to be underſtood, and in ſuch familiar Terms as explain their Nature and Uſe.

The PREFACE.

I have now with the utmoſt Care, Diligence and Probity, endeavour'd to make this Piece of *Arithmetick* the moſt uſeful of its Kind, (conſidering its Bulk and Value) that is at preſent extant: Here is nothing abſtruſe or myſterious, but all plain and eaſy; and nothing but what will bear an intelligible Demonſtration.

I have gone through the whole Book, Line by Line, and have taken all due Care to correct what was amiſs in the other Impreſſions; and as there was no other Hand in the Reviſal made uſe of but my own, I can with greater Aſſurance affirm, and with the more Confidence aſſert, that the Book is now entirely correct: And the *Additions* which are very numerous and conſiderable, (almoſt in every Rule) are now, ſhort and very conciſe in Operation; and pertinently interſpers'd thro' the whole, as I had Opportunity and ſaw Occaſion.

If there ſhould, by Chance, be a Tranſpoſition of a Letter, (tho' there hath been great Care taken of that alſo) or by a greater Chance, a falſe Figure, or Cypher, or a miſplaced one, I hope, nay, I doubt not, but the truly judicious, and candidly ingenious Readers will excuſe me for them; for tho' all may take Care, yet there's none infallible. But I can with a modeſt Boldneſs aſſure them, there is no Occaſion for an *Errata* Page, which may diſcourage them at Beginning, or cool them at the latter End of the Book.

THE

THE

CONTENTS.

CHAP. I. *Of* Numeration, *with various Examples and Methods of Reading and Writing Numbers.*

II. Addition of whole Numbers, *comprehending that of Money, Weight, Meaſure,* &c. *with very uſeful and neceſſary Tables to each Rule.*

III. Subtraction of whole Numbers, *in Money, Weight and Meaſure, with pertinent and familiar Examples for the full and eaſier underſtanding its Nature and Uſe.*

IV. Multiplication of whole Numbers, *with great Variety in the ſeveral Ways of Working that Rule; and alſo new Methods to render it as uſeful in Buſineſs, as if the Learner underſtood the* Rule of Three *and* Practice.

V. Diviſion of whole Numbers, *with new Improvements, and how to make it anſwer many Queſtions that ſeem to require the* Rule of Three *for their Solution.*

VI. Reduction of *Money, Weight and Meaſure, with ſundry Examples of Improvement, and contracting ſeveral Things in that Rule; with a Method of reducing* Groſs Weight *into* Pounds *without Multiplication.*

VII. *Of* Tare *and* Tret, *&c. with great Variety in deducting them in the general and particular way of Buſineſs.*

VIII. The Single Rule of Three Direct, *with great Improvements, and two Methods of contracting moſt Queſtions in that Rule.*

IX. The Single Rule of Three Inverſe, *explained, improv'd, and taught by ſundry and various Examples.*

X. The Double Rule of Three Direct, *with great Variety; and how to work any Queſtion therein, by a Rule compoſed of the five given Numbers.*

CONTENTS.

XI. The Double Rule of Three Inverſe, *as alſo how to operate any Queſtion in that Rule, by a Rule of five Numbers.*

XII. Rules of Practice, *with greater Variety and Brevity than is in any one Book extant.*

XIII. The Rule of Company, *or* Partnerſhip, *with or without Time; as alſo how to contract the tedious or common Methods of working Queſtions in that Rule.*

XIV. Barter, *with the divers Methods of exchanging one Sort of Goods for Another.*

XV. Intereſt, *with ſeveral Examples variouſly wrought; as alſo ſeveral other uſeful things work'd by the ſame Methods that do not come under the Denomination of Intereſt, as* Proviſion, Avarage, *&c.*

XVI. Diſcount, *with ſundry Examples and Methods of Operations.*

XVII. Exchange *in various Examples; with Tables of the ſeveral Species of Foreign Money, and their* Engliſh *Value,* &c.

XVIII. Profit and Loſs, *with facile and conciſe Methods of finding the Gain or Loſs, on any Commodity, either in the whole, or at ſo much* per Cent.

XIX. Fractions Vulgar and Decimal, *work'd together in ſuch intelligible Order, that the meaneſt Capacity may underſtand the Nature and Uſe of both. Alſo,* The Rule of Three in Fractions, *Vulgar and Decimal, and ſome practical Examples of Intereſt wrought decimally,* &c.

XX. *An* Appendix, *containing, the Conſtruction and Uſes of* Tables *for Calculating* Queſtions in Compound Intereſt, *and* Annuities, *or* Leaſes, *in* Poſſeſſion, *or* Reverſion.

ARITHMETICK,

WITH

NEW IMPROVEMENTS,

In the Plaineſt *and* moſt Conciſe METHODS *hitherto extant.*

CHAP. I.

ARITHMETICK is the Art of caſting Accompts by Number, and hath theſe Five Parts, *viz.* NUMERATION, ADDITION, SUBTRACTION, MULTIPLICATION, and DIVISION, which ought thoroughly to be known and underſtood; for by theſe Rules only, the whole Art is attainable, all other being wrought by them.

Of NUMERATION.

NUMERATION teaches to read or write any Sum or Number, known or propoſed.

To which End obſerve, That all Numbers whatſoever, are expreſs'd by, or compoſed of, thoſe ten Figures or Characters, *viz.*

One,	Two,	Three,	Four,	Five,	Six,
1	2	3	4	5	6
	Seven,	Eight,	Nine,	Cypher,	
	7	8	9	0	

The firſt Nine of theſe are called Significant Figures, to diſtinguiſh them from the 0, or Cypher, which, of itſelf, is inſignificant, and therefore, by ſome is called a Nought; but it ſerveth to increaſe or decreaſe the Value of other Figures, according as it is placed.

Every one of the Nine Digits hath two Values; the one certain, by its Form; the other uncertain, by its Place.

The Value of a Figure may be ſaid to be certain, when it ſtands alone, without any Figure or Cypher annex'd to it: Or, if it ſtands in the firſt Place, or Place of Units, in a Number; for then it never ſignifies any more than its own ſimple Value; as 2 is but Two, 6 but Six.

The Value of a Figure may be ſaid to be uncertain, with Reſpect to the Place it is found in: So any of the Nine Figures in the Place of Units, ſignifies but its ſimple Value, (as was ſaid before) but in the ſecond Place it is to be accounted ſo many Tens, as it contains Units. As 5, in the firſt Place, is but Five; but in the ſecond Place it ſignifies ſo many Tens, or Fifty. So that 5 may ſignify Five, or Fifty, or Five Hundred, or Five Thouſand; and 7 may ſignify 7, or Seventy, or Seven Hundred Thouſand, &c.

So every Figure is increaſed in Value, by a Tenfold Proportion, from the Right Hand to the Left. As, in the firſt Place, it is ſo many Units, or Ones; in the ſecond Place, ſo many Tens; in the third Place, ſo many Hundreds; in the fourth, ſo many Thouſands; in the fifth, ſo many Ten Thouſands; in the ſixth, ſo many Hundred Thouſands; in the ſeventh, ſo many Millions, *&c.*

Admit this Number for Explanation, *viz.* 1234567, the 7 is only ſeven Units, or ſeven; but the 6 in the ſecond Place is ſix times Ten, or ſixty; the 5 in the third Place, an hundred times Five, or five Hundred; and 4 in the fourth Place, a thouſand times Four, or four thouſand; the 3, three times ten thouſand, or thirty thouſand; the 2, in the ſixth Place, two hundred Thouſand; and 1, in the ſeventh Place, one Million. Thus the Order of Places is accounted from the Right Hand to the Left, but to be read from the Left Hand to the Right, thus: one Million, two Hundred, thirty four Thouſand, five Hundred, Sixty-ſeven.

If any Figure hath a Cypher, or Cyphers, joined to it it will ſtill retain the Value of its Place, as much as if joined with any other Figure, or Figures, in the room of the Cypher or Cyphers. So if to the Figure 5, there be annexed a Cypher thus (50) its Value is five Tens, or Fifty; becauſe it ſtands in the ſecond Place, or Place of Tens, or, if it have two Cyphers joined with it, thus, (500) its Value is five Hundred; becauſe it poſſeſſeth the Place of Hundreds, or third Place, *&c.*

For the eaſier underſtanding the foregoing Directions, and better reading any Number, obſerve the following *TABLE.*

The Numeration TABLE.

	Hundreds of Millions	Tens of Millions	Millions	Hundreds of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Units			
Places	9	8	7	6	5	4	3	2	1	Milli.	Thouſands	Units
	9	8	7	6	5	4	3	2	1	987	654	321
		9	8	7	6	5	4	3	2	98	765	432
			9	8	7	6	5	4	3	9	876	543
				9	8	7	6	5	4		987	654
					9	8	7	6	5		98	765
						9	8	7	6		9	876
							9	8	7			987
								9	8			98
									9			9

The firſt thing to be done, is to get by Heart the Value of the ſeveral Places, with their Number, at the Head of the Table, *viz.* Units, Tens, Hundreds, Thouſands, *&c.* which being well underſtood, the Learner may thereby be capable of reading or writing any Number propoſed.

And for the eaſier reading the Numbers in the Table, they are, on the Right Hand, ſet by Periods, and over them, the Names of Units, Thouſands, and Millions, and to be read thus; 687 Millions, 654 Thouſands, 321. The next Line, 98 Millions, 765 Thouſands, 432. And the next, 9 Millions, 876 Thouſands, 543, *&c.*

Though this Table conſiſts but of nine Places, yet it might have been extended to twelve, fourteen, or more Places, at Pleaſure. As after Hundreds of Millions, Thouſands of Millions, Ten Thouſands of Millions, Hundred Thouſands of Millions, then Millions of Millions, *&c.*

As, admit this Number of Thirteen Places, *viz.* 1234567890123; for the eaſier reading of which, or any other Number, make a Point under or over every third Figure, beginning at the Right Hand, thus;

1 234 567 890 123

So that the firſt Point is under 1, and the laſt under 2, towards the left Hand; and you are to account every third Place, or Period, Hundreds, and to read it thus, 1 Million of Millions, 234 Thouſands, 567 Millions, 890 Thouſands, 123.

QUESTIONS.

1. *What is 5 in the fifth Place?*

Anſw. By annexing four Cyphers on the Right Hand, thus, 50000; it is Fifty Thouſand.

2. *What is 7 in the ſeventh Place?*

Anſw. By putting ſix Cyphers on the Right Hand, thus, 7000000; it is Seven Millions.

3. *How do you ſet down Eleven Thouſand, Eleven Hundred, and Eleven?*

Anſw. Thus, 12111; 11000 Eleven Thouſand.
1100 Eleven Hundred.
11 Eleven.
———
Proved by *Addition.* 12111 *Proof.*

4. *How do you write Fourteen Thouſand, Fourteen Hundred, and Fourteen?*

Anſw. Thus, 15414 { 14000 Fourteen Thouſand.
1400 Fourteen Hundred.
14 Fourteen.

Proved by *Addition.*
15414 *Proof.*

NUMBERS.

707, Seven Hundred and Seven
4006, Four Thouſands and Six
60606, Sixty Thouſands, Six Hundred and Six
100004, One Hundred Thouſands and Four
7770405, Seven Millions, 770 Thouſands 405
500007, Five Hundred Thouſands and Seven
111111, One Hundred and Eleven Thouſands, 111
999999, A Million wanting One
400400400, Four Hund. Millions, 400 Thouſands, 400
100000000 { Ten Thouſand Times Ten Thouſand, or, One Hundred Millions. *Revelat.* v. 11.
200000000 { Two Hundred Thouſand Thouſand, or, Two Hundred Millions. *Revelat.* ix. 16.
2070040500 { Two Thouſand and Seventy Millions, Forty Thouſand Five Hundred.

A Table of Old Roman *Numbers.*

100	C.	2000	CIↃ.CIↃ. or, M. M.
200	CC.	3000	CIↃ.CIↃ.CIↃ. or, M. M M.
300	CCC.	5000	IↃↃ.
400	CCCC.	10000	CCIↃↃ.
500	D. or, IↃ.	50000	IↃↃↃ.
600	DC.	100000	CCCIↃↃↃ. or, CM.
700	DCC.	500000	IↃↃↃↃ.
800	DCCC.	1000000	CCCCIↃↃↃↃ.
900	DCCCC.	1666	MDCLXVI.
1000	M. or, CIↃ.	1718	MDCCXVIII. or, CIↃ. IↃCCXVIII.

CHAP.

CHAP. II.

Of ADDITION.

ADDITION is the putting two or more Numbers or Sums together, and thereby bringing them into one total Sum.

And is of one Denomination, or ſeveral.

Addition of one Denomination is, when the Numbers or ſeveral Articles from the Top to the Bottom are all of one Name; that is, all *Pounds*, *Gallons*, *Ells*, *Miles*, *Sheep*, &c.

Addition of ſeveral Denominations is, when the ſeveral Lines conſiſt of divers Names; as *Pounds*, *Shillings*, and *Pence*; *Hundreds*, *Quarters*, and *Pounds*; or, *Yards*, *Quarters*, and *Nails*, &c.

Numbers to be added together, muſt be placed in ſuch Order under one another, (it matters not which is uppermoſt, the greateſt or leaſt Numbers) that Units may ſtand under Units; Tens under Tens, Hundreds under Hundreds; Thouſands under Thouſands, *&c.*

As if you were to add 120 Foot, 44 Foot, and 34 Foot together, they muſt be ſet down one under the other, as follows, *viz.*

Feet		*Feet*
120	Or thus,	34
44		44
34		120

Having placed the Numbers to be added as above, draw a Line under them, and begin at the loweſt Figure on the Right Hand, being the Place of Units, ſaying, 4 and 4 is 8, which put directly under the Line, and juſt under its own Rank, under 4, and 4, and 0; and then go to the next Row towards the Left

Hand, ſaying, 3 and 4 is 7, and 2 is 9; which alſo ſet down under the Line, juſt under its own proper Rank, *viz.* under 3, 4, and 2; then go to the laſt Row, where you find but 1, which you muſt put down alſo under the Line juſt under itſelf; and ſo the Numbers are added together; and you will find that they make 198 Feet in all, as by the *Example* following.

Hundreds	*Tens*	*Units*		*Hundreds*	*Tens*	*Units*
1	2	0			3	4
	4	4			4	4
	3	4		1	2	0
1	9	8		1	9	8

When any of the Ranks amount to Ten, or Tens, or they exceed Ten or Tens, then you muſt place a Cypher (if even Tens) under the Line in its proper Place; or elſe what is above Ten or Tens; and for every Ten carry a Unit, or One, to be added to the next Rank. *As for Example:* If the *Series*, or Row, amount juſt to Ten, I ſet down a Cypher under the Line in its Place, (for every Figure or Cypher muſt be ſure to ſtand juſt under its own Rank) and carry one to the next Rank for the one Ten. So if any of the Rows come juſt to even Tens, as 20, 30, 40, *&c.* I ſet down a Cypher, and carry either two, three, or four, according to the Number of Tens. And when it happens, that any of the Ranks exceed Ten or Tens, then whatever the Exceſs is, ſet it down under the Line in its Place. As if it amounts to 45, ſet down 5, and carry 4, for the four Tens to the next Row. If to 72, ſet down 2, and carry 7, for the ſeven Tens, *&c.* And when you come to the laſt Row, ſet down what it amounts to, let it be what it will. *Examples* follow, exemplifying the Directions above.

Add 26 *l.* 15 *l.* 20 *l.* and 45 *l.* together. Alſo 265 Ells, 354 Ells, 460 Ells, 375 Ells and 246 Ells together; which muſt be ſet down as underneath.

Pounds	Ells
26	265
15	354
20	460
45	375
	246
106	1700

Beginning at the lowermoſt Figure in the Place of Units, ſay, 5 and 5 is 10, and 6 is 16, which is 6 over one Ten, wherefore ſet down 6 under its own Rank, and carry 1 for the Ten to the next Rank, ſaying, 1 that you carry and 4 is 5, and 2 is ſeven, and 1 is 8, and 2 is 10, which being the laſt Row, ſet down 10, and the Work is done; and the Total of the four Numbers is 106 *l.* As in the *Example.*

So in the next *Example*, begin with the bottom Figure on the Right Hand, and ſay, 6 and 5 is 11, and 4 is 15, and 5 is 20; which being juſt 2 Tens, and nothing over, ſet down a 0, and carry 2 to the next Rank, for the 2 Tens, and ſay 2 that you carry and 4 is 6, and 7 is 13, and 6 is 19, and 5 is 24, and 6 is 30, which amounting juſt to 3 Tens, ſet down a 0 again, and carry 3 for the 3 Tens, ſaying, 3 that you carry, and 2 is 5, and 3 is 8, and 4 is 12, and 3 is 15, and 2 is 17, which being the laſt Row, ſet down 17, and the Total Sum is 1700 Ells; as may be ſeen in the *Example.*

The Reaſon for carrying One for every Ten, to the Left Hand is, becauſe the Increaſe of every Place that Way, is by a ten-fold Proportion, as was ſaid in *Numeration.*

Examples for Practice.

Yards		*Gallons*	*Pounds*
74		74	746
09		9	379
72	Or thus,	72	024
19		19	100
07		7	074
70		70	047
251		251	1370

Some chuſe to omit the Cyphers on the Left Hand, as in the ſecond *Example*; thinking it a little too preciſe; ſince Cyphers on the Left Hand ſignify nothing; but the other is beſt for a Learner, for his better Underſtanding the Value of the Places, *&c.*

More Examples.

l.	*Ells*	*l.*
71	742	7444
17	371	270
46	462	5000
64	072	500
20	971	6742
2	674	240
56	321	52
65	015	9
341	3628	20257

Here follow ſome familiar *Examples*, ſhewing the Nature, and Uſe of this Rule, *viz.*

Queſtion 1. Between *London* and *Royſton* are 33 Miles; from thence to *Cambridge* 10; thence to *New-Market* 10; thence to *Bury* 10; thence to *Thetford* 10; thence to *Attleborough* 10: and from thence to *Norwich* 12 Miles: How many Miles are there between *London* and *Norwich*?

Set the Numbers down in the following Manner.

Miles.
33
10
10
10
10
10
12
—
Between *Lond.* and *Norwich* are 95 Miles.

Queſtion 2. Again how many Days are there in theſe 12 Calendar Months, or 1 Year?

	Days
January hath	31
February	28
March	31
April	30
May	31
June	30
July	31
Auguſt	31
September	30
October	31
November	30
December	31
Anſw.	365

Queſtion 3. Suppoſe a Farm contains theſe Acres in the ſeveral Fields following, &c.

In

	Acres.
In one Field — —	10
Another —— ——	15
Another —— ——	12
Another ——— —	20
Another —— ———	9
Another —— ——	6
And in another — —	22
How many Acres in all?	94

Queſtion 4. Admit a *Draper* meaſures 9 Pieces of Cloth, and their Contents are, *viz.*

N°	*Yards.*
1 *qt.* — —	25
2 — —	12
3 — —	25
4 — —	10
5 —— —	9
6 — ——	16
7 — —	10
8 — —	20
9 — —	8
Anſw.	135

How many Yards in all?

Note, *That in ſetting down the Numbers, Care muſt be taken, not to place Units under the Place of Tens, but to put them properly, as in the* 5*th and laſt Article of the Sum above.*

Queſtion 5. A *Corn-Factor* bought as follows, *viz.*

	qrs.
Wheat	56
Oats	45
Peas	24
Rye	72
Barley	220
	417 *Quarters in all.*

Queſtion 6. A Ship from the *Indies*, whoſe Cargo is as follows, *viz.*

	l.
In *Pepper*	14280
Other Spices	9741
Diamonds	112579
Callicoes	47217
Muſlins	74219
Drugs	11241

What is the Value of the Whole? *l.* 269277 *Anſw.*

Queſtion 7. What Number is that, from which if you ſubtract 18, the Remainder will be 24?

Anſw. 42. *For if you add* 18 *and* 24 *together, they make* 42, *the Number ſought.*

To prove ADDITION.

Begin at the Top, and caſt it downwards, in the ſame Manner as you did upwards; and if the Figures or Cyphers of the Total prove the ſame as in caſting upwards, the Work is right; otherwiſe they muſt be caſt upwards and downwards till they do agree.

AD-

ADDITION of MONEY.

In *Addition* of ſeveral Denominations muſt be obſerved, how many of the ſmaller Name make one of the next greater: As how many *Farthings* make a *Penny*, how many *Pence* a *Shilling*, and how many *Shillings* a *Pound.* Therefore I ſhall place the ſeveral *Tables*, of *Money*, *Weight*, *Meaſure*, &c. before the *Examples*, they being neceſſary to be firſt known.

Note, 4 *Farthings* make one *Penny*, 12 *Pence* one *Shilling*, and 20 *Shillings* one *Pound.*

In a Pound Sterling, are	20 *Shillings.*
	240 *Pence.*
	960 *Farthings.*

Note alſo, That in *Addition of Engliſh Money*, *l.* ſtands for *Pounds*, *s.* for *Shillings*, *d.* for *Pence*, *qr.* for *Farthings:* Becauſe *Libra* ſignifies a *Pound*, *Solidus* a *Shilling*, *Denarius* a *Penny*, and *Quadrans* a *Farthing.*

But the beſt Way to ſet down *Farthings*, or Parts of a *Penny*, is

$\frac{1}{4}$	A *Farthing*, or Quarter of a Penny.
$\frac{1}{2}$	A *Half-penny*, Half a Penny.
$\frac{3}{4}$	*Three Farthings*, Three Quarters of a Penny.

Example 1.

Suppoſe I owe to one Perſon, 5 *l.* 4 *s.* 6 *d.* to another, *l.* 7 11 9, to another, *l.* 4 07 5, to another, *l.* 7 08 4, to another, *l.* 8 00 0, and to another, *l.* 9 07 6, how much do I owe to all theſe ſeveral Perſons? To do this, theſe ſeveral Sums muſt be ſet down in ſuch order, that *Pounds* may ſtand under *Pounds*, *Shillings* under *Shillings*, and *Pence* under *Pence*, with Diſtances between them as follows.

In

l.	*s.*	*d.*
5	04	6
7	11	9
4	07	5
7	08	4
8	00	0
9	07	6

In caſting up this, and all other Sums in this Rule, you muſt remember, that for every 4 in the *Farthings*, you muſt carry 1 to the Pence, becauſe 4 *Farthings* make a Penny; for every 12 in the Pence you muſt carry 1 to the Shillings, becauſe 12 Pence make a Shilling; and for every 20 in the Shillings, you muſt carry 1 to the Pounds, becauſe 20 Shillings make a Pound; and the Pounds muſt be caſt up as Sums of one Denomination, for every 10, carrying 1 to the next Row. And in all Additions, whether of *Money*, *Weight*, or *Meaſure*, &c. that Denomination towards the Left Hand (which is the firſt in ſetting down, but the laſt in caſting up) muſt be ſo caſt up.

The ſame being again ſet down with a Line drawn under it, appears thus;

l.	*s.*	*d.*
5	04	6
7	11	9
4	07	5
7	08	4
8	00	0
9	07	6
41	19	6

I begin at the ſmalleſt Denomination towards the right Hand, (as in all *Additions* we muſt, whether of *Money*, *Weight* or *Meaſure*) to wit, *Pence*, and ſay, 6 and 4 is 10, and 5 is 15, and 9 is 24, and 6 is 30; now 30 Pence is 2 Shillings and 6 Pence, wherefore I put down the 6 Pence under its own Rank, and carry 2 for the two

Shillings to the Rank of Shillings, ſaying 2 that I carry, and 7 is 9, and 8 is 17, and 7 is 24, and 11 is 35, and 4 is 39; now, 39 Shillings is one Pound 19 Shillings, wherefore I ſet down the 19*s.* under its own Rank, and carry the one Pound to the Pounds, ſaying, 1 that I carry, and 9 is 10, and 8 is 18, and 7 is 25, and 4 is 29, and 7 is 36, and 5 is 41; which being under the Title of Pounds, is forty-one Pounds; ſo the whole Sum is, 41*l.* 19*s.* 6*d.* as in the *Example* may be ſeen.

Addition of ſeveral Denominations, is proved in the ſame Manner as *Addition* of One, by caſting it downwards; and if it agrees with the Sum when caſt upwards, it is right.

There is another Way uſed in *Schools*; that is, to caſt up all again, except the upper Line, and then that Total they add to the upper Line, and if it agree with the Sum firſt found, it is right. But this Way is not ſo practical in Matters of real Buſineſs; therefore I prefer the other before it.

For the readier diſpatch in caſting up the Pence, 'tis very neceſſary to have the following Tables by Heart.

Pence.		*s.*	*d.*
20	is	1	8
30		2	6
40		3	4
50		4	2
60		5	0
70		5	10
80		6	8
90		7	6
100		8	4
110		9	2
120		10	0

Or, 12 times

Pence.		*Pence.*
1	is	12
2		24
3		36
4		48
5		60
7		84
8		96
9		108
10		120
11		132
12		144

Get theſe Tables by Heart, thus; 20*d.* is 1*s.* 8*d.* 30*d.* is 2*s.* 6*d.* &c.

Example 2.

Example 2.

Bought by a Country *Shop-keeper* in *London*, viz.

	l.	*s.*	*d.*
Linen Cloth, to the value of	21	11	4
Sugars	7	10	0
Tobaccoes	16	14	2
Woollen Cloths, and Stuffs	37	10	0
Fruit	11	16	8
Brandy, and Waters	9	14	2
	104	16	4

How much did he lay out in all?

Beginning at the Pence, I ſay, 2 and 8 is 10, and 2 is 12, and 4 is 16; and 16*d.* is 1*s.* 4*d.* I ſet down the 4, and carry the Shilling to the next, the Place of Shillings, ſaying, 1 that I carry, and 4 is 5, (for I omit the tens of Shillings till I come to the Top) and 6 is 11, and 4 is 15, and 1 is 16; then I come downwards with the Tens, ſaying, 16 and 10 is 26, and 10 is 36, and 10 is 46, and 10 is 56, and 10 is 66, and 10 is 76 Shillings, which is 3*l.* 16*s.* I ſet down the 16 under the Place of Shillings, and carry the 3 Pounds to the Pounds, ſaying, 3 and 9 is 12, and 1 is 13, (for I go up but with one Row at a time) and 7 is 20, and 6 is 26, and 7 is 33, and 1 is 34; I ſet down 4 and carry 3, for the 3 Tens, (for the laſt Denomination muſt be caſt up as Sums of one Denomination, for every 10 carrying 1, as was ſaid before) and ſay, 3 that I carry and 1 is 4, and 3 is 7, and 1 is 8, and 2 is 10; which being the laſt Row, I ſet it down. So the whole Sum is 104*l.* 16*s.* 4*d.* as *per* the *Example*.

Example 3.

A Merchant, upon Ballancing of his Books, finds he has in Money, Debts, and Goods, *viz.*

	l.	*s.*	*d.*
In Caſh	2000	00	0
In Cambricks	60	00	0
In Tobaccoes	47	16	6
By *Henry Harper*, owing	121	17	4
In Sugar	246	07	2
In Serges	70	11	0
By Voyage to *Lisbon*	724	06	7
In Indigo	370	12	0
By *William Waxham*	1000	00	0
In Cochineal	424	16	8
By the Ship, *Roſe*	640	11	0
In *Canary* Wine	142	17	0
	5849	15	3

Example 4.

A Brewer's Clerk receives of ſeveral Perſons as follows, *viz.*

	l.	*s.*	*d.*
Of *Laurence Lick-Spiggot*	12	14	0
—*Frank Froth*	9	10	4
—*Sam. Swigg*	20	11	6
—*Ben. Bumper*	36	16	8
—*Henry Here'ſt'ye*	24	00	0
—*Jack Stout*	8	16	6
Received in all, *l.*	112	09	0

Example 5.

Example 5.

A Collector of Exciſe receives in

	l.	*s.*	*d.*
Suſſex	1420	10	6
Kent	0974	11	2
Surry	0641	17	4
Hampſhire	1344	11	1
Hertfordſhire	0741	17	4
Bucks	0617	10	0
Total	5740	17	5

Example 6.

Sold by a *Hoſier*,	*l.*	*s.*	*d.*	*q.*
4 *pr.* Silk Stockings, at	2	10	6	½
7 *pr.* Worſted ditto, at	1	15	2	¼
9 *pr.* Thread Hoſe, at	0	18	3	¾
12 *pr* Childrens, at	2	07	6	½
3 *yds.* Flannel, at	0	02	7	¼
6 *pr.* Mill'd Hoſe, at	1	04	6	¾
In all,	8	18	9	

Here I begin with the Farthings, ſaying, 3 and 1 is 4, and 2 is 6, and 3 is 9, and 1 is 10, and 2 is 12, which is Three-pence, which I carry to the Pence, &c.

Sometimes Sums are *Expreſs'd* one Way, and *Set down* another, *viz.*

Example 7.

	Expreſſed.	*Set down.* *l.*	*s.*	*d.*
For	Coals, Six and Thirty Shillings	1	16	0
	Cloth, Seven and Fifty Shillings	2	17	0
	Sum,	4	13	0

Example 8.

	l.	*s.*	*d.*
A Guinea	1	02	9
A Mark	0	13	4
An Angel	0	10	0
A Noble	0	06	8
A Crown	0	05	0
A Half-Crown	0	02	6
Total,	3	00	3

Example 9.

Expreſſed.	*Set down.* *s.*	*d.*	*q.*
Mutton, *Eight Groats*	2	8	
Onions, *Seven Farthings*	0	1	¾
Tobacco, *Two and Twenty Pence*	1	10	
Wine, *Fifteen Pence*	1	3	
Thread, *Three Half-pence*	0	1	½
Soap, *Nineteen Pence*	1	7	
Veal, *Eleven Groats and Two-pence*	3	10	
Sum,	11	5	¼

Tho' when ſome of theſe Sums are to ſtand alone, and not in Order of *Pounds*, *Shillings* and *Pence*; as in a Letter, *&c.* 'tis better to ſet them down as ſpoken; As 15 *d.* 45 *s.* &c. rather than 1 *s.* 3 *d.* 2 *l.* 5 *s.* &c.

☞ Note, *That in ſetting down your Sums, Care muſt be taken that you do not ſet down more or ſo much in the Place of a leſſer Denomination, that makes one of the next greater: For it would be abſurd to write down* 18 l. 22 s. 15 d. *for* 19 l. 3 s. 3 d. *Or*, 15 C. 3 q. 29 ℔. *for* 16 C. 0 q. 1 ℔.

Some uſed formerly, (and ſome of weak Heads do now) to make a *Point* or *Stop*, at every four in the Farthings; at every 12 in the Pence; at every 20 in the Shillings; and at every 10 in the Pounds; if they conſiſt of ſeveral Ranks, carrying ſo many Ones, as they find Points or Specks in one Denomination, to the next: But this Way is both tedious and ſlovenly. But if your Sums are very large, you may make a Stop at every 60, in the Pence, for 5 *s.* and carry accordingly to the Shillings; and for the Units-Rank in Shillings, caſt them up as Sums of one Denomination, for every Ten carrying One to the Tens of Shillings, and reckon them as ſo many Ones; and when you come up to the Top, halve them, which Half, carry to the Pounds; but if they halve not even, ſet down the odd One in the Ten's Place of *Shillings*, &c. *Examples* of which you will find in the following Page.

Whenever there is a Neceſſity to *Point* or *Stop*, do it rather upon your Nail, or on a Bit of Paper, than in your Book, or Paper where the Sum is; becauſe, in proving it, the Points very rarely happen in the ſame Place; and the many *Stops* may be apt to confound you, and alſo make the Work appear foul.

Example 10.

l.	*s.*	*d.*
16	17*	10
47	11	6.
74	06	9
54	19	7
45	09	8
72	14	5
27	04	3
16	07*	9
61	17	8
24	06	7.
42	17	5
24	19	7
47	11	5
74	01	9
41	00	7
36	17	5
47	17	9
20	10	11
777	12	10

Example 11.

l.	*s.*	*d.*
714	19	6
412	10	7
374	11	9
241	14	5
474	16	4
372	12	6
330	12	9
200	07*	9.
472	12	7
521	09	6
245	17	8
324	12	2
725	15	4
317	13	9
972	14	5
321	15	7
733	17	3
245	11	1
8004	04	11

Here, in the 10th *Example*, I begin at the bottom, ſaying thus, 11 and 9 is 20, *&c.* till I come to the Article 24*l.* 6*s.* 7*d.* where the Figures amount to 65, where I make a *Point* or *Stop*, for 5*s.* and carry 5 to the next Figure over it, ſaying, 5 and 8 is 13, *&c.* till I come to the Article 47 *l.* 11 *s.* 6 *d.* where it amounts to juſt 60: and there I make another *Point* for 5*s.* more; and for the odd 10 *d.* I ſet it down in its Place, and carry the two 5's making 10, to the Shillings, ſaying, 10 and 7 is 17, and 7 is 24, *&c.* till I come to the Top, where it amounts to 102; wherefore I ſet down 2, and carry 10 to the Tens of Shillings; ſaying, 10 and 1 is 11, *&c.*

And at the Top it comes to 21, the Half of which is 10, and 1 over, which I place on the Left Hand of the 2, and it makes 12 *s.* and I carry the 10 to the Pounds, ſaying, 10 and 7 is 17, and 6 is 23, *&c.* caſting the *Pounds* up as Sums of one Denomination; and the Total is 777*l.* 12*s.* 10*d.* As in the *Example* may be ſeen.

Or the *Shillings* may be caſt up by *Pointing* at every 60, and 40, in the Unit Rank of *Shillings*, which make 5 *l.* As at the Articles, *l.* 16-07-9* and *l.* 16-17-10* or uppermoſt Number, where a ſmall *Aſteriſm* is placed, to denote it accordingly. At the Top it comes to 42; I ſet down 2 and carry 5*l.* to the Tens of *Shillings*, taking two of them as I go up, for 1 *l.* ſaying, 5 I carry, and 1 is 6, and 1 is 7, *&c.*

AVOIRDUPOIS-WEIGHT.

By this Weight is weighed all Kind of *Grocery* Wares; or Goods ſubject to waſte; as *Tobacco*, *Sugar*, *Fruit*, *Drugs*, *Butter*, *Cheeſe*, *Allom*, *Iron*, *Braſs*, *Lead*, *Soap*, *Tallow*, *Pitch*, *Rozin*, *Tin*, *Salt*, *Wax*, *Flax*, *Hemp*, and all Kinds of Garble Goods, *&c.*

A Table of Avoirdupois-Weight.

			Marks.
16 Drams	make	1 Ounce	*oz.*
16 Ounces		1 Pound	lb.
28 Pounds		1 Quart of a Hund.	*qu.*
4 Quarters		1 Hundred	*C.*
20 Hundred		1 Tun	*T.*

⁂ Note, *A Pound* Avoirdupois-Weight, *is equal to* 14 *Ounces* 12 *Penny-Weight*, Troy.

In a Tun Weight are,

573440	*Drams*
35840	*Ounces*
2240	*Pounds*
80	*Quarters*
20	*Hundreds Weight, of* 112℔. *each.*

AVOIRDUPOIS Great Weight.

Examples.

(10)	(20)	(4)	(28)	(10)	(20)	(4)	(28)
Tuns	*C.*	*qr.*	℔.	*Tuns*	*C.*	*qr.*	℔.
7	14	3	12	7	11	1	12
5	19	1	06	6	07	2	15
9	07	1	00	7	09	1	17
7	07	2	12	4	15	1	06
2	15	0	20	6	07	1	14
9	17	3	21	2	17	0	19
43	02	0	15	35	08	0	27

Here you muſt begin at the leaſt Denomination towards the right Hand (as before in Money) *viz.* Pounds; ſaying, 21 and 10 is 31, (taking but one 10 in the 20, for the eaſier reckoning) which is 3 above 28; make a *Point* on your Nail for the Quarter, and ſay, 3 and 10 that was left in the 20, is 13, and 12 is 25, and 6 is 31; make another *Point*, and ſay 3 and 12 is 15, which ſet down under its own Rank; and for the two *Points*, or *Stops*, made for the Quarters, carry 2 to the Quarters, ſaying, 2 and 3 is 5, and 2 is 7, and 1 is 8, and 1 is 9, and 3 is 12; now 12 Quarters, is juſt 3 *C.* wherefore ſet down 0, and carry 3 to the Hundreds;

and proceed as in *Money*, (20 *C.* making a *Tun*, as 20 *s.* did a Pound) ſaying, 3 and 7 is 10, and 5 is 15, and 7 is 22, and 7 is 29, and 9 is 38, and 4 is 42; and coming down with the Tens, ſay, and 10 is 52, and 10 is 62, and 10 is 72, and 10 is 82, which is 4 *Tuns*, and 2 *C.* over; which I ſet down, and carry 4 to the *Tuns*, ſaying, 4 and 9 is 13, and 2 is 15, and 7 is 22, and 9 is 31, and 5 is 36, and 7 is 43; and ſo the Sum is finiſhed, the Total being 43 *Tuns*, 02 *C.* 0 *qr.* and 15 lb. As in the *Example* may be ſeen.

The Figures over the Title of each reſpective Denomination, ſhew what you muſt ſtop or point at, and are diſtinguiſhed thus; (10) (20) (4) and (28)

More Examples for Practice.

(10)	(20)	(4)	(28)
Tuns	*C.*	*qr.*	lb.
74	13	0	15
46	11	1	17
44	09	2	06
74	19	3	16
44	07	0	21
74	14	1	15
359	15	2	06

(10)	(20)	(4)	(28)
Tuns	*C.*	*qr.*	lb.
74	14	1	16
41	06	1	11
24	15	2	07
19	06	3	15
26	14	1	07
14	12	2	15
201	10	0	15

Twelve Hogſheads of Tobacco, containing, *viz.*

No.	*C.*	*qr.*	℔.
1	7	3	12
2	4	1	17
3	9	0	24
4	6	3	26
5	5	1	17
6	4	2	20
	38	2	04

No.	*C.*	*qr.*	℔.	*Tare.*
7	5	1	24	90
8	4	2	19	94
9	4	3	23	99
10	3	3	21	84
11	4	1	23	79
12	4	3	24	96
	28	1	22	542

71	1	19
47	3	24
57	2	16
71	0	21
47	1	12
51	2	06
347	0	14

46	1	19
24	3	03
23	0	21
67	2	13
27	1	17
34	3	23
224	1	12

AVOIRDUPOIS Small Weight.

This is in uſe chiefly for *Silk*, as among *Stocking-makers*, *Weavers*, &c. they delivering their *Silk*, out and in, by *Pounds*, *Ounces*, and *Drams*.

Examples.

	(16)	(16)
℔.	*oz.*	*qr.*
4	10	06
7	14	12
5	07	04
9	14	15
4	05	07
6	11	14
39	00	10

	(16)	(16)
℔.	*oz.*	*qr.*
4	11	14
2	13	12
7	10	15
4	07	14
6	09	06
4	07	10
30	13	07

But in weighing *Worſted*, and ſome other Things, 'tis uſual to go no lower than a quarter of an Ounce; as in theſe *Examples.*

	(16)	(4)
℔.	*oz.*	*dr.*
4	13	1
7	12	2
9	11	3
7	04	2
4	13	1
34	07	1

	(16)	(4)
℔.	*oz.*	*dr.*
9	07	2
7	10	1
8	15	3
7	12	2
3	13	3
37	11	3

Wool is alſo weighed by *Avoirdupois* Weight, but differently divided, according to the following Table, *viz.*

Note, that

			or
7	Pounds is one Cloves		lb.
2	Cloves, one Stone		14
2	Stone, one Tod		28
6½	Tod, one Wey		182
2	Weys, one Sack		364
12	Sacks, one Laſt		4368

And in a *Laſt* of *Wool*, are

4368	Pounds
624	Cloves
312	Stone
156	Tod
24	Weys
12	Sacks.

Note, That the Wey differs in ſome Counties; as in *Suffolk*, the Wey is 336 lb. or 42 Cloves; in *Eſſex*, 256, or 32 Cloves; and according to the Diviſion above; 182 lb.

TROY WEIGHT.

By this Weight are weighed *Jewels*, *Gold*, *Silver*, *Pearl*, *Electuaries*, and *Liquors*. A Pint of *Water*, *Wine*, &c. being a Pound. And the uſual Denominations are *Pounds*, *Ounces*, *Penny-Weights*, and *Grains*; as in the following Table.

Note,

		make		
24	*Grains*		1	*Penny Weight*
20	*Penny Weight*		1	*Ounce*
12	*Ounces*		[illegible]	*Pound*

In a Pound *Troy*, are

5760	*Grains*
240	*Penny Weight*
12	*Ounces*

25 lb. 1 Quarter of a Hundred.
100 lb. 1 Hundred Weight.
20 Hundred 1 Tun of Gold or Silver.

The

The Value of Gold.	*l.*	*s.*	*d.*	*The Value of Silver.*	*l.*	*s.*	*d.*
1 Pound Wt. is worth	48	0	0	1 Pound Wt.	3	2	0
1 Ounce	4	0	0	1 Ounce	0	5	2
1 Penny-Weight	0	4	0	1 Penny Wt.	0	0	3 $\frac{1}{10}$
1 Grain	0	0	2	1 Grain, ½ a *Farthing*.			

A Tun of Gold at 4*l.* the Ounce, *l.* 96000.
A Tun of Silver at 5*s.* the Ounce, *l.* 6000.

Examples of Troy-Weight.

	(12)	(20)	(24)
l.	*oz.*	*dwt.*	*gr.*
5	10	12	20
5	04	06	13
7	07	07	06
5	04	19	14
4	11	04	14
6	04	17	21
35	07	08	16

	(12)	(20)	(24)
l.	*oz.*	*dwt.*	*gr.*
5	10	10	11
4	11	17	19
6	10	01	10
5	06	14	15
4	10	14	17
2	05	04	08
30	07	03	08

(10)	(20)	(24)
oz.	*dwt.*	*gr.*
24	13	10
19	11	15
07	04	14
21	13	16
11	05	23
08	04	12
14	07	10
15	10	11
122	11	15

(10)	(20)	(24)
oz.	*dwt.*	*gr.*
105	10	05
217	06	08
360	03	06
195	11	07
217	02	09
196	02	08
321	07	05
172	08	11
1785	11	11

Here is no Occaſion for Pointing, but only in the Grains: But if you do ſtop at more, only mind the Figures over the Titles, as before in *Avoirdupois Weight*, and they direct at what to Point.

Note, A Pound *Troy* is about 13 Ounces, 2 Drams and a half *Avoirdupois*; or as 17 to 14; and the Ounce *Troy*, as 51 to 56.

		l.	s.	d.
A Pound *Troy* of Gold	is worth	48	00	0
A Pound *Avoirdupois* of Gold		58	08	0
A Pound *Troy* of Silver	is worth	03	03	0
A Pound *Avoirdupois* of Silver		03	15	3½

	℔.	oz.	
100*l.* in Gold, weighs	1	11¾	*Avoirdupois*
100*l.* in Silver, weighs	26	04 0	

A Pound *Avoirdupois* is heavier than a Pound *Troy*; but the Ounce *Avoirdupois* is lighter than the Ounce *Troy*; for the Ounce *Troy* weighs 480 Grains, but the Ounce *Avoirdupois* but 438 Grains.

APOTHECARIES WEIGHT.

Apothecaries have their Weight deduced from *Troy*; their Pound being the ſame, to wit, 12 Ounces; but differently divided, as follows, *viz.*

			Marks.
20 Grains	make	1 Scruple	℈
3 Scruples		1 Dram	ʒ
8 Drams		1 Ounce	℥
12 Ounces		1 Pound	℔

By theſe Weights *Apothecaries* compound their Medicines; but they buy and ſell their Drugs by *Avoirdupois* Weight.

Examples.

	(12)	(8)	(3)	(20)
℔	℥	ʒ	℈	*gr.*
4	10	7	2	19
3	10	6	1	10
2	09	5	0	06
1	08	4	2	04
1	06	3	1	12
1	00	0	0	00
15	10	3	2	11

(10)	(12)	(8)	(3)	(20)
℔	℥	ʒ	℈	*gr.*
48	07	1	1	17
12	11	4	2	12
24	09	7	1	07
19	10	5	2	12
34	06	6	0	00
24	04	4	1	15
165	00	6	1	03

In a Pound are,
5760 Grains
288 Scruples
96 Drams
12 Ounces

CLOTH MEASURE.

Note, that	4 Nails	make	1 Quarter
	4 Quarters		1 Yard
	5 Quarters		1 Ell *English*
	3 Quarters		1 Ell *Flemiſh*

Qrs.		*Nails.*		
3	or	12	make	1 Ell *Flemiſh*
4		16		1 Yard
5		20		1 Ell *Engliſh*
6		24		1 *French* Aulme, or Ell

Examples.

Yds.	*qrs.*	*Nls.*	*El. Eng.*	*qrs.*	*Nls.*	*El. Flem.*	*qrs.*	*Nls.*
(10)	(4)	(4)	(10)	(5)	(4)	(10)	(3)	(4)
14	1	3	24	3	3	25	2	3
21	2	2	17	4	1	36	1	2
56	1	0	46	2	2	42	2	3
42	2	3	27	1	0	54	2	1
17	0	2	34	4	3	61	1	2
24	1	2	51	2	2	72	2	3
176	1	3	202	3	3	294	1	2

LIQUID MEASURE.

Is of two Sorts; one for *Wine*, *Spirits*, *Oil*, &c. And the other for *Ale* and *Beer*. The Tables of which are as follow.

In WINE MEASURE.

231 Solid Inches,	make	1 Gallon
42 Gallons,		1 Tierce
63 Gallons, or 1 Tierce and ½		1 Hogſhead
2 Hogſheads		1 Pipe, or Butt
2 Pipes or Butts,		1 Tun
84 Gallons,		1 Puncheon

By this you Meaſure all Wines, Brandies, Spirits, ſtrong Waters, Cyder, Perry, Mead, Oil and Honey.

In a Tun are,
2016 Pints
1008 Quarts
252 Gallons
14 Rundlets
6 Tierces
3 Puncheons
4 Hogſheads
2 Pipes, or Butts.

Note, 18 Gallons is a Rundlet.
31½ Gallons is a *Wine*, or *Vinegar* Barrel.
A Tun weighs 18 C. *Avoirdupois.*

Note, *Oil and Honey are meaſured by Wine-Meaſure.*

Note, That *Sweet Oil* hath but 236 Gallons to the Tun, but *Whale-Oil*, or *Oil* from *Greenland*, hath 252 to the Tun.

In BEER MEASURE.

282 Solid Inches	make	1 Gallon
9 Gallons		1 Firkin
2 Firkins		1 Kilderkin
2 Kilderkins		1 Barrel
1½ Barrel, or 54 Gallons.		1 Hogſhead

Note, *That in all other Places beſides* London, *the Firkin of Beer and Ale contains* 8½ *Gallons.*

In a Barrel of *Beer* are,
10152 Solid Inches
288 Pints
144 Quarts
72 Pottles
36 Gallons
4 Firkins
2 Kilderkins

Note, That 3 Barrels, or 108 Gallons, make 1 Butt of *Beer.*

ALE MEASURE.

282 Solid Inches	make	1 Gallon
8 Gallons		1 Firkin of *Ale*, *Soap*, or *Herrings*
2 Firkins		1 Kilderkin
1½ Barrel, or 48 Gallons		1 Hogſhead

In a Barrel of *Ale* are,
9024 Solid Inches
256 Pints
128 Quarts
64 Pottles
32 Gallons
4 Firkins
2 Kilderkins

The *Beer* and *Ale* Gallons are the ſame, *viz.* 282 ſolid Inches, but with this Difference, *i. e.* the Barrel of *Beer* contains 1128 Cubick Inches more than the Barrel of *Ale*, that is, 4 Gallons.

Examples of Wine Meaſure.

(10) *Tuns.*	(4) *Hds.*	(63) *Gal.*	(8) *Pints.*
71	2	19	4
24	1	27	6
12	2	56	4
42	0	37	7
15	3	60	2
166	3	12	7

(10) *Tuns.*	(4) *Hds.*	(63) *Gal.*	(8) *Pints.*
75	2	24	7
44	1	17	2
27	1	46	6
29	1	19	4
24	3	46	4
201	2	28	7

DRY MEASURE.

By this are meaſured, all ſorts of Grain, Salt, Sea-Coal, &c.

Note, that	2 Pints	Make	1 Quart
	2 Quarts		1 Pottle
	2 Pottles		1 Gallon
	2 Gallons		1 Peck
	4 Pecks		1 Buſhel
	8 Buſhels		1 Quarter, or 2 Comber
	4 Quarters		1 Chaldron
	5 Quarters		1 Wey
	2 Weys		1 Laſt

Note, Four Pecks is one Buſhel Land-Meaſure; and 5 Pecks one Buſhel Water-Meaſure.

Obſerve likewiſe, That when Salt and Sea-Coal are meaſured by the Corn-meaſure, they are heaped; or elſe there are 5 ſtriked Pecks to the Buſhel; and 36 Buſhels is a Chaldron of Coals; there being 21 Chaldrons to the Score, in the River of *Thames*.

A Gallon contains 268$\frac{4}{5}$ Cubick Inches; and a Buſhel of Corn, 2150$\frac{2}{3}$ Cubick Inches.

Note, A Buſhel ought to be 18$\frac{1}{2}$ Inches wide, and 8 Inches deep, as by Act of Parliament in 1697.

Some make 6 Quarters of Meal a Wey; and 1 Wey 3 Quarters, a Laſt.

Examples of Dry Meaſure.

(10) *Qu.*	(8) *Buſh.*	(4) *Peck.*	(2) *Gal.*
24	6	2	1
17	3	2	0
20	7	1	1
15	5	0	1
21	2	1	1
19	4	2	0
119	5	2	0

(10) *Ch.*	(4) *Qu.*	(8) *Buſh.*	(4) *Pecks.*
174	3	6	3
241	1	7	2
296	2	4	3
171	1	5	0
097	0	5	2
471	2	4	3
1453	1	2	1

LONG MEASURE.

Note,

3 Barley-Corns make one Inch
12 Inches one Foot
3 Foot one Yard
3 Foot 9 Inches, one Ell *Engliſh*
2 Yards, or 6 Foot, one Fathom
5 Yards ½, or 16 Foot and ½, one Pole
40 Square Poles, or 220 Yards, one Furlong
8 Furlongs, or 1760 Yards, one Mile
3 Miles one League
20 Leagues, or 60 Miles, 1 Degree
360 Degrees, or 21600 Miles, is ſuppoſed to be the Circumference of the Earth and Sea.

Note, That an *Engliſh* Mile, is 286 Feet leſs than an *Italian* Mile. And that 5 Foot is a Geometrical Pace.

In a Mile are,
190080 Barley-Corns
63360 Inches
5280 Feet
1760 Yards
320 Poles
8 Furlongs
80 Chains
1056 Paces
1408 Ells
8000 Links of the Chain.

Example in Long Meaſure.

(10) *Miles.*	(8) *Furl.*	(40) *Poles.*
24	6	22
37	5	26
15	4	34
74	3	39
41	7	24
194	4	25

(10) *Miles.*	(8) *Furl.*	(40) *Poles*
37	4	21
20	3	17
42	5	19
31	6	27
52	4	19
185	0	23

From the preceding Table of *Long Meaſure*, is deduced this of *Land Meaſure*, viz.

Forty Poles (or Perches) in Length, and 4 in Breadth, make an Acre, or 160 ſquare Perches. Or 4840 ſquare Yards make an Acre, or 43560 ſquare Feet.

A *Hide* of Land is 100 Acres; 40 ſquare Poles make a Rood, and 4 Roods an Acre.

Note, The Pole or Perch, of 16 Foot $\frac{1}{2}$ is *Statute-Meaſure*; but there are ſome cuſtomary Meaſures which are more; as for Fens and Wood Lands, there are reckoned 18 Foot to the Pole; and for Foreſts, 21 Foot to the Pole.

Examples.

(10) *Acres.*	(4) *Roods.*	(40) *Poles.*
14	2	24
26	3	29
17	1	19
26	2	20
36	2	36
24	1	12
146	2	20

(10) *Acres.*	(4) *Roods.*	(40) *Poles.*
74	2	27
61	1	20
20	2	36
14	3	11
37	1	10
27	2	34
236	2	18

TIME,

Is meaſured by Years, Months, Weeks, Days, Hours, Minutes; as in the Table following.

Marked			*In a Year are*
60″ Seconds	Make	1 Minute	31557600 *Sec.*
60′ Minutes		1 Hour	525960 *Min.*
24 Hours		1 Day natural	8766 *Hrs.*
7 Days		1 Week	365 *Dys.*
4 Weeks		1 Month	52 *Wks.*
13 Months, 1 Day, and 6 Hours		1 Solar Year	

A *Century* is 100 Years; an *Indiction* among the *Romans*, a Revolution of 15 Years.

Of the Motion *of the Heavenly Bodies.*

60″ Seconds	Make	1 Minute
60′ Minutes, or Miles		1 Degree
30 Degrees		1 Sign
62 Signs, or 360 Deg.		1 Revolution of the whole Sphere, or 360 Degrees.

DOZENS.

There are ſeveral Commodities ſold by the Dozen, a Table of which follows, *viz.*

In a great Groſs are	1728 Pieces or Things
	144 Dozens
	12 Small Groſs.

Square Meaſure.

16	Quarters of an Inch	make	one Inch
144	Inches		one Foot
9	Foot		one Yard
30	Yards½, or 272¼ ſquare Feet		one Pole
40	Poles long, and 1 broad		one Rood
4	Roods		one Acre
640	Acres		one Mile

In a ſquare Acre are 4 ſquare Roods, 160 ſquare Poles, *&c.* and in a ſquare Pole, 30 ſquare Yards ¼.

In a ſquare Mile are	
4014489600	Inches
27878400	Feet
3097600	Yards
102400	Poles
3560	Roods
640	Acres

Some other Things neceſſary to be known, and of Uſe in Arithmetick.

Of F I S H.

120 of *Ling*, *Cod*, or *Haberdine*, to the 100, *viz.*

120	accounted	100
1200		1000, or a Barrel
10000		A Laſt, or 12 Barrels

Paper and Parchment.

1 Bale is 5 Bundles; 1 Bundle, 2 Reams; 1 Ream, 20 Quires, 1 Quire, 24 (or 25) Sheets. 1 Roll of Parchment, 5 Dozen; 1 Dozen, 12 Skins.

Of WOOD.

A Cord of Wood is 4 Foot over, 4 Foot deep, and 8 Foot long, being 128 Cubick Feet. A Stack of Wood is 3 Foot over, 3 Foot deep, and 12 Foot long, being 108 Cubick Feet.

Block Wood, being great Logs, are ſold by the Cord, and ſmall by the Stack. A Cubick Foot is 1728 Cubick Inches. A Cubick Yard, 27 Cubick Feet, 46656 Inches. 4 Inches is a Hand in meaſuring a Horſe. 2 Foot is one Pace. 4 Poles, or 100 Links, 1 Chain. 125 Geometrical Paces 1 Stade. 8 Stades an *Italian* Mile. 4000 Geometrical Paces a ſmall *German* Mile, and 5000 a Great. 160 Perches in Length, and 1 in Breadth; or 80 in Length and 2 in Breadth; or 40 in Length, and 4 in Breadth make an Acre of Land. 10 Foot every way is a Square; that is, 100 ſquare Feet. A Faggot of Steel, 120℔. A burthen of *Gad* Steel, 9 Score, or 180℔. A Sack of Coals, 3 Buſhels; *Scots* Coals, 112℔. to the *C.* A Load of Timber 50 Foot, a Tun 40. A Load of Hay 36 Truſſes, and 56 Pound the Truſs; or 4 Stone, at 14 Pound the Stone; but new Hay ought to be 60 Pound the Truſs. 500 of Bricks a Load; and 1000 plain Tiles the ſame. 35 Buſhels of Lime 1 *C.* A Brick ought to be 9 Inches long, 4½ broad, and 2½ thick. A Tun of Train Oil 252 Gallons; a Tun of Sweet Oil 236 Gallons. Raw Silk (except *China*) is 24 Ounces to the Pound. A Tun of Lead, called a Fodder 19½ *C.* A Gallon of wheaten Meal weighs 7 Pound *Avoirdupois*. A Dicker of Hides, or Skins, are 10; and 20 Dickers a Laſt. A Stone of Glaſs is 5 Pound; a Seam of Glaſs is 24 Stone. 40 Skins make a Timber of Sables, Martins, Minks, Jennits, Fitches and Greys. 120 to the Hundred, of Coney, Kid, Lamb, Budge, and Cat-Skins; 50 to a Kip of Goat-Skins; and 13 tann'd Calf Skins a Dozen.

CHAP.

CHAP. III.

SUBTRACTION,

IS the taking of a leſſer Number, or Sum, out of a greater, thereby to find the Remainder, or Difference, between the ſaid two Numbers; as if you take 13 from 19, the Remainder or Difference is 6.

Subtraction is of one Denomination, or of divers.

Of one, when the two Numbers are both of one kind, that is, both Yards, Gallons, Pounds, *&c.*

Of divers, when the two Sums conſiſt of Pounds, Shillings, and Pence; or Tuns, Hundreds, Quarters, and Pounds, *&c.*

Subtraction is juſt the Reverſe of *Addition*; for that puts Numbers together, but *this* takes Numbers from each other.

In ſetting down Numbers for Work, you muſt always place the greater Number or Sum uppermoſt; and in ſuch Order, that Units may ſtand under Units, Tens under Tens, Hundreds under Hundreds, *&c.* as before in *Addition.*

A General Rule.

Whatever you ſtop at in *Addition*, the ſame you muſt borrow in *Subtraction*, when Need requires, remembring always to pay it to the next Figure towards the Left Hand.

Example 1.

Suppoſe I would know the Difference between 453 Yards bought, and 232 Yards ſold.

I ſet them down as underneath, and as before recited, *viz.*

	Yards.	
Bought	453	Great Number
Sold	232	The Leſſer
Differ.	221	Remains unſold
	453	Proof

After I have drawn a Line under the Sum, I begin at the firſt Figure towards the Right Hand, (as in *Addition*) and ſay, 2 from 3 (the Figure juſt over it) and there remains 1, ſetting it in its proper Place under the Line; and then go to the next Figure, ſaying, 3 from 5, and there remains 2, which I alſo put under the Line; and then to the laſt Figure, ſaying, 2 from 4, and there remains 2, and the Work is done; and I find the Remainder of Yards unſold to be 221; or that 453 is 221 more than 232; to prove the Truth of which I add the Remainder, or Difference, to the leſſer Number, and if the two put together, make the greater or upper Number, the Sum is right, otherwiſe not; wherefore I ſay, 1 and 2 is 3, and 2 and 3 is 5, and 2 and 2 is 4, which are the ſame Figures with the upper or greater Number. Wherefore I know the Work is right, as may be ſeen in the *Example*. And by this way are all Sums of one Denomination proved in this Rule.

Example 2.

Let it be required to find the Difference between 756 Gallons received, and 444 Gallons delivered. To do which, I ſet the Numbers, the one under the other, as before directed, and they ſtand thus.

Gall.
756 Greater
444 Leſſer
———
312 Rem.
———
756 Proof
———

Then having drawn a Line under them, I begin and ſay, 4 from 6, and there reſts 2; and 4 from 5 and there remains 1; and 4 from 7, and there remains 3: So the Work being done, I find the Difference to be 312; or ſo many Gallons remaining. And it is proved by *Addition*, as before; as may be ſeen by the Work above.

When any one of the under Figures is greater than the Figure over it, then you muſt borrow 10 [as you carried 10 in *Addition*] and put it to the Figure from whence you were to ſubtract, and then take it from their Sum, paying 1 for the ſaid 10 borrowed, to the next Figure towards the left Hand in the lower Line.

Example 3.

I would ſubtract 496 Pounds paid, from 654 Pounds lent, *viz.*

l.
Lent 654 Greater
Paid 496 Leſſer
———
158 Reſts due
———
654 Proof
———

Having ſet down the Numbers, as before directed, with a Line under them, I ſay, 6 from 4 I cannot, (but putting 10 to the ſaid 4, it is made 14) 6 from 14, and there remains 8, which I ſet down under the Line, then I ſay, 1 that I borrowed and 9 (the next Figure) is 10, from 5 I cannot, but 10 from 15, (adding 10 to the 4) and there reſts 5, which alſo ſet down; then, 1 that I borrowed and 4 is 5, from 6, and there remains 1. The Sum being thus finiſhed, I find that there remains due, or unpaid, 158 Pounds, which is proved by *Addition*, as before.

Example 4.

Suppoſe there is advanced on a *Subſidy*.

	l.
	636420
Paid off	47294
Remainder	589126
Proof	636420

How much remains?

Here I ſay, 4 from 0 I cannot, but 4 from 10, and there remains 6; 1 that I borrowed and 9 is 10 from 2 I cannot, but 10 from 12 and there reſts 2; then 1 that I borrowed and 2 is 3, from 4, and there remains 1; (here I borrow none, ſo muſt not pay any thing to the next Figure) then 7 from 6 I cannot, but 7 from 16, and there remains 9; 1 that I borrowed and 4 is 5, from 3 I cannot, but 5 from 13, and there remains 8; and now becauſe there is no Figure ſtanding under the 6, to carry the 1 borrowed to, I ſuppoſe a 0 to be placed there, and ſay, 1 that I borrowed, and 0 is 1, from 6, and there remains 5; and ſo the Work is done, and the remainder is 589126 *l.* as in the *Example*.

More Examples for Practice.

	l.
Borrowed	14075
Paid	08424
Reſt due	5651
Proof	14075

	Ells.
Bought	74000
Sold	29460
Reſt unſold	44540
Proof	74000

	Sheep
Received	492
Delivered	397
Remains	95
Proof	492

Advanced	47692
Paid off	29767
Remains	17925
Proof	47692

Some Queſtions proper to this Rule, ſhewing its Nature and Uſe.

Queſt. 1. What is the Difference between a Piece of Timber containing 56 Foot, and another Piece of 29 Foot?

Feet.
56
29
Anſ. 27

Queſt. 2. A Man borrowed *l.* 96 and paid 58, what remains due?

96
58
Anſ. 38

Queſt. 3. If a Perſon hath 150 Miles to travel, and hath gone 99 Miles, how many Miles hath he yet to go?

Miles.
150
99
Anſ. 51

From 100 *Pounds borrowed, take* 72 *paid;*
'Twas a Virgin that lent it, what's due to the Maid?
Anſw. *l.* 28

Queſt. 4. If a Perſon be 48 Years of Age, this preſent Year, what Year was he born in?

Years
1762
48
1714

Queſt. 5. How many Years ſince the *Spaniſh* Invaſion, it being in the Year 1588?

Greater Number 1762
Leſſer Number 1588
Years ſince 174

From 90 *take* 30, *from* 40 *take* 10;
Subtract 6 *from* 60, *and what remains then?*

Anſw. 144

Queſt. 6. What Number muſt be put to 297 *l.* to make it 730?

730
297

Anſw. 433

Proof 730

In fifteen hundred ninety-two there dy'd a noble Prince,
How many Years is it ago, that is, how many ſince?

1762
1592

Anſw. 170

Queſt. 7. What 5 Numbers and all different, will make juſt 65?

To do this, ſet down four different Numbers at random, obſerving that they do not amount to the Number propoſed: and add them together, and ſubtract that Total from the Number propoſed, and the Remainder will be the 5th Number, to make the other Numbers 65, as in the following

Example.

65 The Number propoſed.

12
13 The four Numbers ſet down at Random.
9
16

50 Total

15 The 5th Number

And ſo of any other Number propoſed to be made up by different Numbers, let them be 5, 6, 7, *&c.* Remembring always, that the Random Numbers be leſs than the Numbers propoſed to make up the Number aſſigned.

Of MONEY.

When the Sums to be ſubtracted are of divers Denominations, whether they be *Money*, *Weight*, or *Meaſure*, the ſame Method muſt be obſerved in ſetting them down as in *Addition*; that is, the ſeveral Names muſt be ſet juſt under one another; as Pounds under Pounds, Shillings under Shillings, and Pence under Pence, *&c.* with Diſtances between them; always obſerving that the great Sum muſt be uppermoſt, as before in Sums of one Denomination. Then proceed to take the under Sum out of the uppermoſt, beginning at the leaſt Denomination towards the Right Hand, as in *Addition*; and the ſame Reſpect muſt be had, when there is occaſion to borrow, as before in *Addition*, obſerving how many of the leſſer Denomination make one of the next greater, and borrow accordingly; remembring always to pay what you borrow to the next Denomination.

Example.

I would ſubtract 247 *l.* 11 *s.* 9 *d.* ½. *Disburſements*, from 372 *l.* 11 *s.* 6 *d.* ¼. *Received.* To do which, I ſet them down as before directed; and then they ſtand thus:

	l.	*s.*	*d.*	
Received	372	11	6¼	Greater
Diſburſ.	247	11	9½	Leſſer
Remains	124	19	8¾	
Proof	372	11	6¼	

I begin at the leaſt Denomination towards the Right Hand, *viz.* Farthings, ſaying, 2 from 1 I cannot, wherefore I borrow one from the next Name which is Pence, one of which is 4 Farthings, but 2 from 4 and there remains 2, (which remainder always add to the upper Number, or Figure you ſubtract from, for the more eaſy reckoning) and the 1 Farthing over it makes $\frac{3}{4}$, which I place under the Line, and go to the next Denomination of Pence, ſaying, 1 that I borrowed and 9 is 10, from 6 Pence I cannot, but I borrow one of the next, which is Shillings, one of which is 12 Pence; but 10 Pence from 12 Pence, and there remains 2, which I put to the Figure 6 I ſubtract from, and it makes 8, which I alſo put under the Line, in its proper Place, and then I go to the next Denomination which is Shillings, ſaying, 1 that I borrowed and 11 is 12, from 11 Shillings I cannot, wherefore I borrow one of the next, which is Pounds, (one of which is 20 Shillings) but 12 from 20 and there remains 8, and the 11 Shillings over it, which I ſubtract from, is 19, which I place under the Line, in its place; then going to the Pounds, I ſay 1 that I borrowed, and 7 is 8, from 2 I cannot (here I borrow 10 as in Sums of one Denomination) but 8 from 12 and there remains 4, then 1 that I borrowed and 4 is 5, from 7 and there remains 2; and laſtly, 2 from 3 and there remains 1: And ſo the Sum is finiſhed, and the Remainder or Difference, 124 *l.* 19*s.* 8*d.* $\frac{3}{4}$, as by the *Example* may be ſeen.

Example.

A Collector of the *Exciſe* hath received 2479*l.* 12*s.* 6*d.* $\frac{3}{4}$, and paid into the Office by ſeveral Remittances, 1977*l.* 11*s.* 2*d.* How much remains in his Hands?

	l.	*s.*	*d.*
Received	2479	12	6 $\frac{3}{4}$
Paid	1977	11	2
Remains in his Hands	502	01	4 $\frac{3}{4}$
Proof	2479	12	6 $\frac{3}{4}$

Here I begin and ſay, nothing from ¾, and there remains ¾; then 2 from 6, and there remains 4; and 11 from 12, and there remains 1; and then I go to the Pounds, ſaying, 7 from 9 and there remains 2; and 7 from 7, and there remains 0; and 9 from 4 I cannot, but 9 from 14 and there remains 5; and 1 that I borrowed and 1 is 2, from 2 and there remains 0; and ſo the Sum is done; and he hath remaining in his Hands, 502 *l.* 01 *s.* 4 *d.* ¾, as by the ſaid Work.

More Examples for Practice.

		(20)	(12)		(20)	(12)	(10)	(20)	(12)
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
From	7	10	1	5	00	0	77	00	7
Take	4	07	9	3	11	5	57	04	6
Rem.	3	02	4	1	08	7	19	16	1
Proof	7	10	1	5	00	0	77	00	7

		(20)	(12)	(4)	(10)	(20)	(12)	(4)		(20)	(12)	
Dr.	7	11	1	½	476	10	9	¼	7	00	0	
Cr.	4	17	3	¼	277	17	7	¼	4	10	4	¾
Bal.	2	13	10	¼	198	13	2		2	09	7	¼
Pr.	7	11	1	½	476	10	9	¼	7	00	0	

	(10)	(20)	(12)	(4)	(10)	(20)	(12)	
	l.	*s.*	*d.*	*q.*	*l.*	*s.*	*d.*	*q.*
Borrowed	419	02	10	¼	7174	11	1	
Paid	197	03	10	½	2176	15	9	¼
Rem. due	221	18	11	¾	4997	15	3	¾
Proof	419	02	10	¼	7174	11	1	

When a Sum is borrowed, or a Debt paid, at ſeveral Times, then you add the ſeveral Sums of Payment into one Total and ſubtract that Total from the firſt lent, or otherwiſe due.

Examples.

Suppoſe *A* lends *B* 70 *l.* and *B* hath paid *A* at ſeveral Times, *viz.*

Lent, —	*l.* 70	00	0
Paid at one Time, —	24	10	0
Another Time, —	7	11	6
Another, — —	20	00	0
Another, — —	4	10	6
Another, — —	1	01	6
Paid in all,	57	13	6
Remains due,	12	06	6
Proof,	70	00	0

To prove this, add the Sum paid in all, and the Sum reſting due, together; and if they make the Sum firſt lent, the Work is right.

	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
Lent	7	10	0	560	10	9 ¼	1	01	6
Paid at ſeveral Times	1	10	6	146	10	5	0	07	6
	0	11	9	17	15	0	0	01	6
	0	07	6	97	17	6	0	02	6
	2	10	6	76	00	0	0	01	6
	0	07	9	100	17	4	0	02	0
	1	10	0	100	01	7	0	01	0
Pd. in all,	6	18	0	539	01	10	0	16	0
Rem.	0	12	0	21	08	11 ¼	0	05	6
Proof,	7	10	0	560	10	9 ¼	1	01	6

A fami-

A familiar Example.

	l.	s.	d.
Received of Mr. *Eaſt*	59	06	0
pd. to Mr. *Weſt*	20	00	0
pd. to Mr. *North*	14	13	6
pd. to Mr. *South*	15	12	0
Paid in all	50	05	6
Remains in the Bag	09	00	6

What Eight Sums of Pounds, Shillings, and Pence and all different, will amount to juſt 50*l.*

To do this you muſt obſerve the Directions given in *Page* 47. *Queſtion* 7, for Sums of one Denomination; and ſee the following Work.

From *l.*	50	00	0	the Sum aſſigned.
The Seven Sums ſet down at random	4	17	6	
	5	01	6	
	1	01	6	
	7	11	4	
	6	04	2	
	9	03	9	
	8	13	5	
Subtract	42	13	2	
Remainder	7	06	10	The eighth Sum.

AVOIRDUPOIS-WEIGHT.

Here you are only to obſerve the Title of your Account, and borrow accordingly when there is Occaſion.

Example 1.

An *Ironmonger* buys 74 *Tuns*, 13 *C.* 2 *qrs.* 14 ℔. of *Bilboa* Iron, and hath ſold out of the ſaid Parcel, 56 *Tuns*, 11 *C.* 1 *qr.* 20 ℔. How much remains unſold?

I ſet down the Sum as before directed, that each Denomination may ſtand under that of the ſame kind, and draw a Line under them, as may be ſeen in the Margin.

	(10)	(20)	(4)	(28)
	Tuns.	*C.*	*qrs.*	℔.
	74	13	2	14
	56	11	1	20
	18	02	0	22
Proof	74	13	2	14

I begin at the Right Hand, and ſay, 20 from 14 I cannot, but 20 from 28 (ſo many ℔. making a *qr.* of an Hundred, an Integer of the next Name) and there remains eight; which add to the 14, and they make 22, which I place under the Line; and go to the Quarters, and ſay, 1 that I borrowed, and 1 is 2, from 2, and there remains 0; which I alſo ſet down, then 11 from 13 *C.* and there reſts 2, which I likewiſe put down, and go to the *Tuns*, ſaying, 6 from 4 I cannot, but 6 from 14, and there remains 8; then 1 that I borrowed, and 5 is 6, from 7, and there reſts 1. And ſo the Work is done, and I find there remains unſold, 18 *Tuns*, 2 *C.* 0 *qrs.* 22 ℔.

Example 2.

A *Grocer* buys 96 *C.* 2 *qrs.* 20 ℔. of *Raiſins*, and ſells out again, 46 *C.* 3 *qrs.* 24 ℔. what Quantity remains in his Hands?

	C.	*qrs.*	℔.	
Bought	96	2	20	*Greater Number*
Sold	46	3	24	*Leſſer Number*
Remains in his Hands	49	2	24	
Proof	96	2	20	

Here I ſay, 24 from 20 I cannot, but 24 from 28, and there remains 4; and the 20 over it makes 24, which I ſet down; then 1 that I borrow, and 3 is 4, from 2 I cannot, but 4 from 4, and there reſts 0; but 2 that ſtands over it, is 2, which I ſet down; then 1 that I borrowed, and 6 is 7, from 6 I cannot, but 7 from 16, and there reſts 9, and 1 that I borrowed, and 4 is 5, from 9, and there remains 4. So there remains in his Hands 49 *C.* 2 *qrs.* 24 lb, and proved by *Addition*, by putting the Remainder and *Leſſer* Sum together, and they make the *Greater*; and therefore the Work is right.

Examples for Practice.

	(10)	(20)	(4)	(28)	(10)	(4)	(28)
	Tuns.	*C.*	*qrs.*	lb.	*C.*	*qrs.*	lb.
Received,	700	11	1	17	756	3	24
Deduct.	421	04	2	20	327	1	25
Rem.	279	06	2	25	429	1	27
Proof,	700	11	1	17	756	1	24

C.	*qrs.*	lb.	*C.*	*qrs.*	lb.	*C.*	*qrs.*	lb.
4	0	12	24	1	12	9	0	00
3	1	07	19	2	24	5	3	15
0	3	05	04	2	16	3	0	13
4	0	12	24	1	12	9	0	00

Admit I have on Board of a Ship from *Jamaica*, 94 *Tuns*, 13 *C.* 0 *qrs.* 00 lb. of *Log Wood*, and have received by ſeveral Lighters, as follows, *viz.*

	(10)	(20)	(4)	(28)
	Tuns.	*C.*	*qrs.*	℔.
On Board — —	94	13	0	00
By one Lighter —	12	11	3	09
Another — —	19	14	0	21
Another — —	17	12	2	24
Another — —	15	14	3	06
Received,	65	13	2	04
Remains on board	28	19	1	24

	(10)	(4)	(28)		(10)	(4)	(28)
	C.	*qrs.*	℔.		*C.*	*qrs.*	℔.
Sugar bought,	49	3	12	*Currants,*	70	2	20
Sold at ſeveral Times.	4	1	14		10	1	14
	9	2	17		7	2	14
	4	1	25		1	1	20
	7	3	20		12	1	19
	8	1	27		9	3	12
	9	2	20		10	0	00
Sold in all,	44	2	11		51	2	23
Rem. unſold,	5	1	01		18	3	25
Proof	49	3	12		70	2	20

Avoirdupois ſmall Weight.

	(10)	(16)	(16)	(10)	(16)	(16)
	℔.	*oz.*	*dr.*	℔.	*oz.*	*dr.*
Delivered,	4	10	14	46	13	10
Received,	2	09	09	27	15	14
Remains,	2	01	05	18	13	12
Proof.	4	10	14	46	13	10

Delivered

	(10) ℔.	(16) *oz.*	(16) *dr.*	(10) ℔.	(16) *oz.*	(16) *dr.*
Delivered	55	00	00	79	15	14
Received	37	10	14	49	15	15
Reſts due	17	05	02	29	15	15
Proof	55	00	00	79	15	14

TROY-WEIGHT.

	(10) ℔.	(12) *oz.*	(20) *dwt.*	(24) *gr.*	(10) *oz.*	(20) *dwt.*	(24) *gr.*
Received	24	09	14	12	756	12	15
Melted	19	07	15	20	478	11	22
Remains	05	01	18	16	278	00	17
Proof	24	09	14	12	756	12	15

	(10) ℔.	(12) *oz.*	(20) *dwt.*	(24) *gr.*	(10) *oz.*	(20) *dwt.*	(24) *gr.*
Received	370	07	12	20	7420	15	20
Delivered	174	11	09	22	5789	18	15
Remains	195	08	02	22	1630	17	05
Proof	370	07	12	20	7420	15	20

CLOTH-MEASURE.

	(10) *Yds.*	(4) *qrs.*	(4) *N.*	(10) *Ells Eng.*	(5) *qrs.*	(4) *N.*
Bought	54	2	2	420	3	2
Sold	27	2	3	247	4	3
Remains	26	3	3	172	3	3
Proof	54	2	2	420	3	2

I might give Examples in *Subtraction* of all the other Rules mentioned before in *Addition*, viz. of *Apothecaries Weight*, *Dry* and *Liquid Meaſure*, &c. but all of them being worked in the ſame Manner with thoſe before, it is unneceſſary.

CHAP. IV.

MULTIPLICATION.

I. IN this Rule there are always two Numbers given to find out a Third, which will contain either of the given Numbers, as often as the other containeth Units.

II. This Rule alſo excellently and moſt conciſely performeth the Work of *Addition*, either in ſimple or compound Numbers; as ſhall be illuſtrated and proved by ſundry *Examples*, *Explications*, and *Improvements*, not hitherto treated of.

III. It likewiſe ſerveth to bring great Denominations into leſs, of the ſame Value; as *Pounds* into *Farthings*; and *Tuns Weight* into *Pounds Weight*, &c.

IV. *Multiplication* hath three Parts, or Things, particularly to be noted, and known, *viz.*

1*ſt*, The *Multiplicand*, or *Number* to be *Multiplied*; and is generally the greateſt of the two Numbers given.

2*dly*, The *Multiplier* or *Number* by which you *Multiply*; and is generally the leaſt of the two *Numbers* given.

3*dly*, The *Product*, or Reſult of the *Multiplication*; which is the Anſwer.

V. Before any Procedure can be made, the following *Table* muſt be got perfectly by Heart.

MULTIPLICATION-TABLE.

2 times, or rather twice	2	is	4
	3		6
	4		8
	5		10
	6		12
	7		14
	8		16
	9		18
	10		20
	11		22
	12		24
3 times	3	is	9
	4		12
	5		15
	6		18
	7		21
	8		24
	9		27
	10		30
	11		33
	12		36
4 times	4	is	16
	5		20
	6		24
	7		28
	8		32
	9		36
	10		40
	11		44
	12		48
5 times	5	is	25
	6		30
	7		35
	8		40
5 times	9	is	45
	10		50
	11		55
	12		60
6 times	6	is	36
	7		42
	8		48
	9		54
	10		60
	11		66
	12		72
7 times	7	is	49
	8		56
	9		63
	10		70
	11		77
	12		84
8 times	8	is	64
	9		72
	10		80
	11		88
	12		96
9 times	9	is	81
	10		90
	11		99
	12		108
10 times	10	is	100
	11		110
	12		120
11 times	11	is	121
	12		132
12 times	12	is	144

The foregoing Table is ſo plain and eaſy, that it needs no Explanation; and therefore I ſhall proceed immediately to the Rule of Working.

VI. When any Number is given to be multiplied by another ſet the biggeſt uppermoſt, which is the *Multiplicand*, and under that your *Multiplier*, in the ſame Order as in *Addition* and *Subtraction*, viz. Units under Units, Tens under Tens, &c. Then draw a Line, and proceed, beginning at the Right Hand, and multiply every particular Figure of the *Multiplicand* by the *Multiplier*:

Example 1.

How much is 3 times	472	*Multiplicand*?
	3	*Multiplier*.
Anſw.	1416	*Product*

Here I ſay, 3 times 2 is 6, which I put under the Line as in the *Example*; then 3 times 7 is 21, I ſet down 1, and carry 2, for the 2 Tens, to the next; (as in *Addition* of one Denomination) then 3 times 4 is 12, and 2 that I carry is 14; ſo becauſe it is the laſt Figure I ſet down 14, and the Work is done, ſo I find that 3 times 472 is 1416, the *Product*, or Reſult of 472, multiply'd by 3.

If the ſaid 472 be three times ſet down, one under the other, and added together, the Total will be the ſame with the Product above; which ſhews, that *Multiplication* briefly performs the Work of *Addition*, [as we ſaid before] which is ſhewn in the Margin.

```
  4 7 2
  4 7 2
  4 7 2
 -------
1 4 1 6
```

Example

Example 2.

How many makes 742 *Multiplicand*
Multiply'd by 4 *Multiplier*

2968 *Product*

Here I ſay, 4 times 2 is 8, which I ſet down under the Line; then 4 times 4 is 16; I ſet down 6, and carry 1 for the 10 to the next Figure; then 4 times 7 is 28, and 1 that I carry is 29; and it being the laſt, I ſet it down; ſo the Work is done, and I find the Product, or Anſwer, to be 2968, as above.

To prove the Work, multiply the *Multiplier* by the *Multiplicand*, and if the Product prove [as before] the ſame Figures, it is right. This is the quickeſt and beſt Way of proving *Multiplication*, till *Diviſion* be known.

I do not move the Sum to any other Place, but let it ſtand as before multiply'd, and begin with the firſt Figure of the *Multiplicand*, towards the Right Hand, to multiply the *Multiplier*, ſaying, twice 4 is 8, which I find to be right. Then to the next Figure, which is 4, and multiply the *Multiplier* by that, ſaying, 4 times 4 is 16, which is 6, and carry 1, which I alſo find right. Then to the next and laſt Figure in the *Multiplicand*, which is 7, and multiply the *Multiplier* 4 by that alſo, ſaying, 7 times 4 is 28, and 1 that I carried is 29, which I likewiſe find right; and ſo the Work is prov'd, and known to be truly wrought.

Example 3.

What is the Product of 90704 *Multiplicand*
Multiplied by 8 *Multiplier*

725632 *Product*

Here I begin, ſaying, 8 times 4 is 32, I ſet down 2 and carry 3; then 8 times 0 is 0, but 3 that I carry is 3; then 8 times 7 is 56, I ſet down 6 and carry 5, then 8 times 0 is 0, but 5 that I carry is 5. Laſtly, 8 times 9 is 72, which I ſet down, and the Work is done; as by the Example above. And this is proved as before, by multiplying the *Multiplier* by the *Multiplicand*, ſaying, 4 times 8 is 32, *&c.*

This Way of Proof is alſo a Perfecting any one in the *Multiplication Table*; becauſe the Digits, or nine Figures are multiplied forwards and backwards; So that they may as readily anſwer, that 9 times 8 is 72, [not found in the Table, but reverſely] as that 8 times 9 is the ſame.

More Examples for Practice.

Multiply 7460 Multiplicand
By 7 Multiplier

52220 Product or Anſw.

How many are 9 times 365?
Or, how many Days in 9 Years?

3285

Multiplicand	432107	596432
Multiplier	5	6
Product	2160535	3578592

709543	675908	7654309
7	8	9
4966801	5407264	68888781

VII. When the Multiplier conſiſts of more Figures than One, then there muſt be as many ſeveral Products as there are Figures in the Multiplier, and placed under the Line, and added together, and the Total is the whole Product required. But obſerve always to place the firſt Figure of each Product juſt under the Figure you multiply by, and ſo you move one Place towards the Left Hand for every Product, be as many as there will.

Example 1.

How much is 24 times	365	Multiplicand?
Or, how many Hours in a Year?	24	Multiplier
	1460	Product by 4
	730	Product by 2
	8760	Total Product

The Numbers being placed in Order, as above, and according to the VIth Rule of this Chapter, after having drawn a Line under them, I begin with the firſt Figure in the Multiplier, *viz.* 4, ſaying, 4 times 5 is 20, I ſet down 0, and carry 2; then 4 times 6 is 24, and 2 I carry is 26, that is 6 and carry 2; then 4 times 3 is 12, and 2 is 14; and ſo I have done with the Figure 4. Then I go to the ſecond Figure in the Multiplier, *viz.* 2, and multiply the Multiplicand 365, by that alſo, ſaying, twice 5 is 10, I ſet down 0, and carry 1, which 0 I ſet down juſt under the Figure 2, that I multiply by, and go a Place farther to the Left Hand, as was ſaid before. Then I go on, ſaying, twice 6 is 12, and 1 I carry, is 13, that is 3, and carry 1, and twice 3 is 6, and 1 is 7; and ſo I have done with this Figure of the Multiplier alſo; and then I draw a Line under theſe two Products, and add them together, and they make 8760 for anſwer. And ſo the Work is done, as may be ſeen in the Example above, and may be proved as before.

Example 2.

Let it be required to multiply 527537
By — — — 285

2637685
4220296
1055074

150348045

A Line being drawn under the two Numbers, I proceed, ſaying, 5 times 7 is 35, *&c.* going thro' all the Figures of the Multiplicand by 5, and find its Product to be 2637685, then I go to the next Figure in the Multiplier, *viz.* 8, and Multiply all the Figures of the Multiplicand by that alſo, and find the Product 4220296; then I multiply the Multiplicand by the laſt Figure, *viz.* 2, and the Product by that is 1055074. Then drawing a Line under theſe three Products, I add them together, and find their Total to be 150348045, for the true Product ſought: That is, I find that 285 times 527537 amounts to 150348045; as by the Work above may be ſeen.

VIII. Whenever the Multiplier is ſuch a Number, that any two Numbers of the Multiplication Table being multiplied together, make the ſaid Multiplier; as in the foregoing Page, where the Multiplier is 24, and is made by multiplying 6 and 4 together. Then if you multiply the Mulplicand, by either of them Numbers, that is, either 6 or 4, and then multiply that Product by the other Number, the laſt Product ſhall be the Anſwer, and the ſame with the other Way.

Example.

365 Multiplied
4

1460
6

8760 Product. And ſo of any other.

There are ſometimes Figures ſav'd by this Method; and there is no Addition of Products.

More Examples.

4765	6796	476
14	17	19
19060	47572	4284
4765	6796	476
66710	115532	9044

56071592	275827
123	19725
168214776	1379135
112143184	551654
56071592	1930789
	2482443
6896805816	275827
	5440687575

How to prove Multiplication by the Croſs.

The common way us'd in Schools is this: They make a Croſs thus X, then add all the Figures in the Multiplicand together, as in *Addition*, and caſt away the Nines, as oft as they ariſe, and bear the Remainder to the next Figure; and when they come to the End of the Line, they note what remains after the Nines are caſt away, and ſet ſuch Remainder on the left Side of the Croſs; and then they do the ſame by the Multiplier, and note what remains there alſo, and ſet that on the Right of the Croſs; then they multiply them two Figures together, and caſt the Nines out of that Product, and ſet the Remainder on the Top of the Croſs: Laſtly, they caſt away the Nines out of the Product, and if the Remainder be like the Figure on the Top of the Croſs, they ſet it down at the Bottom, and conclude the Work right.

But this way of Proof is not infallible, as I have experienced many times: But this may be ſaid for it, that if a Sum be done right, it will never appear to be wrong by this Way; but it many times makes a Sum appear right, when it is utterly falſe; and therefore not to be depended on as a certain Proof. I'll give one Example to make the foregoing Directions the more intelligible; which ſhall be one of the preceding Sums ſet down again here, *viz.* the Second foregoing.

3	56071592 Multiplicand
8 X 6	123 Multiplier
3	6896805816 Product

Here, after having made the Croſs, thus; X

I begin at the Multiplicand, it's no matter at which End; but I'll begin towards the Left Hand, ſaying, 5 and 6 is 11, I caſt away 9, and there reſts 2, and 2 and 7 is 9, and there reſts nothing; then 1 and 5 is 6, (I miſs the 9) and 2 is 8, which I ſet on the Left of the Croſs, as it appears in the

8 X 6

3
8 X 6
3

Margin. Then going to the Multiplier, I ſay, 1 and 2 is 3, and 3 is 6, which I place on the Right. Then multiply one by the other, ſaying, 8 times 6 is 48, I caſt away 5 Nines out of it, and there remains 3, which I put on the Top, as you ſee in the Margin. After the ſame Manner I caſt away the Nines out of the Product, and at the laſt there remains three likewiſe; and ſo the Work is done.

☞ Note, *That the Figures on each Side of the Croſs, being multiplied, make* 48, *and if you add them two Figures together, as they ſtand, and caſt away the Nines, the Remainder will be the ſame; that is, inſtead of ſaying, how many Nines in* 48? *you ſay,* 8 *and* 4 *is* 12; *the Nines in* 12, *once, and there remains* 3, *as before.*

IX. The greateſt Difficulty in Multiplication is, when there is a Cypher, or Cyphers intermixt with the Figures. In ſuch Caſes, only remember what was ſaid before in the VIIth *Rule*, to move for every Figure, or Cypher, one Place towards the Left Hand, and to take Care that each firſt Figure of the ſeveral Products ſtand directly under its reſpective Multiplier; an *Example* will make it eaſy to be underſtood.

Let it be required to multiply 50710984, by 4050607, having ſet the Numbers down as before directed, with a Line under them, they ſtand thus.

50710984 Multiplicand
4050607 Multiplier

354976888
3042659040
2535549200
2028439360

205410266767288

Here I begin, ſaying, 7 times 4 is 28, *&c.* and ſo go through the Multiplicand by 7, and find its Product 354976888; then I come to a Cypher, which I ſet down under the ſecond Figure of the above-mentioned Product, *viz.* 8, then I multiply the Mulplicand by the next Figure of the Multiplier, *viz.* (6 in the ſame Line) ſaying, 6 times 4 is 24; I ſet down 4 next to the Cypher, in the ſame Line, and it ſtands under the third Figure in the laſt Product, juſt under its Multiplier 6, and I find this Product, or Line, to be 3042659040. Then coming to another Cypher, I ſet it down juſt under its own Place, and go forward with the next Figure 5, in the ſame Line as before, ſaying, 5 times 4 is 20, *&c.* I ſet down the 0, juſt under 5 the Multiplier, and find this Product to be 2535549200. Then I come to another Cypher, and proceed as before, and find this laſt Line, or Product, 2028439360. All which Products being added together, make 20541026767288, for Anſwer. See the foregoing Work.

More Examples.

7864371
20604

31457484
471862260
157287420

162037500084

327586
6030

9827580
1965516

1975343580

X. When there is a Cypher, or Cyphers, in the Multiplier towards the Right Hand, then ſet it, or them backward from the Place of Units, towards the Right Hand, and multiply by the ſignificant Figure or Figures, as uſual; and afterwards annex the Cypher, or Cyphers, to the general Product, on the Right Hand, as in the following

Examples.

326	4762	4796
20	70	400
6520	333340	1918400

746094	729764
3600	476000
4476564	4378584
2238282	5108348
	2919056
2685938400	347367664000

XI. When there are Cyphers both in the Multiplicand and Multiplier, then omit the Cyphers in both, till you have multiplied by the ſignificant Figures; and then join the Cyphers in each to the Product; as in theſe

Examples.

42600	423000	376400
220	5600	2400
852	2538	15056
852	2115	7528
9372000	2368800000	903360000

CONTRACTIONS.

Or, how to multiply by 10, 100, 1000, 10000, &c.

To multiply by		Add to the Multiplicand
	10	0
	100	00
	1000	000
	10000	0000
	100000	00000

Example.

428 Multiply'd by	10	makes	4280
	100		42800
	1000		428000
	10000		4280000
	100000		42800000

If you would be Expeditious and Dextrous in *Accompts* always to multiply by 11 and 12, that the Product may be in one Line only.

Examples.

Mult.	456	7890	3425
By	11	11	11
Prod.	5016	86790	37675

In the firſt of theſe, I ſay, 11 times 6 is 66, 6 and go 6; and 11 times 5 is 55, and 6 is 61, 1 and go 6; and 11 times 4 is 44, and 6 is 50, as above; and ſo of the reſt.

Mult.	1234	56789	30762
By	12	12	12
Prod.	14808	681468	369144

Here I ſay, 12 times 4 is 48, 8 and carry 4; and 12 times 3 is 36, and 4 is 40, 0 and go 4, &c.

When any Number is to be multiplied by 5, it may be contracted by annexing a Cypher to the Number, and then halve it, becauſe 5 is the ½ of 10.

And the Rule holds good for Brevity if a Number is to be multiplied by 15. *Example*, Multiply 567 by 15,

5670

½ 2835

By 3 becauſe 3 times 5 is 15.

8505

When you multiply by any of theſe compound Numbers, *viz.* 110, 120, 1100, or 1200, then multiply as before, and annex the Cyphers afterwards.

Examples.

Mul.	3762	34567	46972	96796
By	110	120	1100	1200
Prod.	413820	4148040	51669200	116155200

Which way of Multiplying is much better than the following.

Or thus,

3762	34567
110	120
37620	691340
3762	34567
413820	4148040

XII. To multiply by Article Numbers, *viz.* 13, 14, 15, *&c. a* 20, to have the Work in one Line.

Examples.

74974	45678
13	18
974662	822204

Or thus,

74974	45678
224922	365424
974662	822204

RULE,

RULE *for the two firſt Examples.*

Multiply each Figure in the Multiplicand by the Unit Figure of the Multiplier, adding to each ſingle Product its back Figure; and to the laſt Figure add what you carry.

As in the firſt Example, I ſay, 3 times 4 is 12, 2 and go 1; and 3 times 7 is 21, and 1 carried is 22, and 4, the back Figure of the Multiplicand, is 26, 6 and go 2; and 3 times 9 is 27, and 2 is 29, and 7, the back Figure, is 36, 6 and go 3; and 3 times 4 is 12, and 3 is 15, and 9, the back Figure, makes 24, 4 and carry 2; then 3 times 7 is 21, and 2 is 23, and 4 the back Figure is 27; 7 and go 2, which 2 add to the laſt Figure 7, and it makes 9, as in the Work.

In the two laſt Examples, I multiply by the Unit Figure of the Multiplier, and ſet the firſt Figure of the Product one Place forward to the Right Hand, *&c.*

XIII. To multiply by a *mixt Number*; that is a *whole Number* joined with a *Fraction*, whether it be $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{3}$, or $\frac{1}{5}$.

The RULE.

When you have multiply'd by the whole Number, take the $\frac{1}{4}$, the $\frac{1}{2}$, the $\frac{1}{3}$, the $\frac{3}{4}$ or the $\frac{1}{5}$, of the Multiplicand, and add it to the Product, and that Total ſhall be the whole Product, as in the following *Example.*

Example 1.

In 276 Barrels of Raiſins
Each 3 $\frac{1}{4}$ C. How many Hundred Weight?

828 The Product by 3.
69 The 4th Part of the Multiplicand, 276.

Anſw. 897 Hundred Weight in all.

Example 2.

In 756 Pieces of Stuffs,
Each $24\frac{1}{2}$ Yards, how many Yards?

3024
1512
378 the Half of the Multiplicand, 756.

Anſw. 18522 Yards in all.

Example 3.

In 63 Fodder of Lead,
Each $19\frac{1}{2}$ *C.* How many Hundreds?

567
63
$31\frac{1}{2}$ the Half of 63, the Multiplicand.

Anſw. $1228\frac{1}{2}$ Hundreds Weight in all.

If the Multiplier had been accounted Money, or 19*s.* 6*d.* and the Multiplicand 63 Integers, at that Price, then the Product would have been 1228 *s.* 6*d.* or 61*l.* 8 *s.* 6*d.*

Example 4.

In 24 Caſks of Tobacco,
Each $2\frac{3}{4}$ *C.* How many Hundreds?

48
12 The Half of 24.
6 The 4th Part of 24, or Half of 12.

Anſw. 66 Hundreds in all.

'Twould have been the ſame if I had ſaid 24 *pr.* of Stockings, or any thing elſe, at 2 *s.* $\frac{3}{4}$, or 2 *s.* 9 *d.* (for 9 *d.* is $\frac{3}{4}$ of a Shilling) then the Product would have been, 66 *s.* or 3 *l.* 6 *s.*

Example 5.

224 *French* Crowns
At 54 $\frac{1}{3}$ *d. pr.* Crown

896
1120
74 $\frac{2}{3}$ The $\frac{1}{3}$ of 224, the Multiplicand.

Pence 12170 $\frac{2}{3}$

Example 6.

340 Groſs of Paſte-Boards
At 7 $\frac{1}{5}$ *d. per* Groſs, Cuſtom

2380
68 The $\frac{1}{5}$ Part of 340

Prod. 2448 *Pence*

This Method of multiplying by a mixt Number, is of excellent uſe in a Multitude of Caſes, particularly in Exchange of Money of different Nations.

XIV. I ſhall now ſhew the excellent uſe of *Multiplication*, in anſwering all manner of Queſtions, that ordinarily occur in Buſineſs; where we have the Price of one Thing, and want to know the value of many Things at that Rate; and ſhew that it performs the Office, and anſwers the Work of Queſtions in the *Rule of Three Direct*, of that kind; but in a much conciſer Method, and more elegant Manner; and that by ſuch eaſy Rules and Directions, that any one that underſtands *Addition of Money*, ſhall as readily caſt up any thing this Way, as he ſhall in a Sum in that: For nothing is more required here, than to carry from one Denomination to the next, exactly as we do there; and therefore it may be truly ſaid, that this *Rule* performeth the Work of many *Additions*, as was hinted before.

Example

Example.

How much is 3 times
Or 3 Yards of Cloth, at
11 *s.* 9 *d.*

l.	s.	d.	
	11	9	Multiplicand?
		3	Multiplier.
l. 1	15	3	Prod. or Anſw.

The RULE.

Obſerve always to multiply the Price by the Quantity, and the Product is the Anſwer.

Here I ſay, 3 times 9 is 27 Pence, which is 2 *s.* and 3 *d.* I ſet down 3 *d.* under the Place of Pence, and carry the 2 *s.* to the Shillings; then 3 times 11 is 33, and 2 that I carry is 35 *s.* which is 1 *l.* 15 *s.* I ſet down the 15 *s.* under the Shillings Place, and ſet down the 1 Pound a little forward to the Left Hand; and ſo the Queſtion is anſwered, and found to amount to 1 *l.* 15 *s.* 3 *d.* as by the Work above. Now here is no more difficulty than in *Addition*; it being the ſame in effect, and altogether as eaſy.

l.	*s.*	*d.*
	11	9
	11	9
	11	9
1	15	3

If 11 *s.* 9 *d.* is three times ſet down, as in *Addition*, and caſt up, it will prove the ſame, as may be ſeen in the Margin; and is a ſure Proof of the Truth of this Method.

Example 2.

How much is 5 times 7 *s.* 4 *d.*? Or, 5 Gallons of *Brandy*, at 7 *s.* 4 *d.*

	l.	*s.*	*d.*	
Multiplicand,		7	4	The Price
Multiplier,			5	The Quantity
Product,	1	16	8	Anſw.

Here I ſay, 5 times 4 is 20 Pence, which is 1 *s.* 8 *d.* I ſet down 8 and carry 1, juſt as in *Addition of Money*, (and nothing more is required to be remembered, let the *Example* be what it will) and 5 times 7 is 35 *s.* and 1 I carried is 36 *s.* which is 1 *l.* 16 *s.* I ſet down the 16 *s.* under the Place of Shillings, and the 1 *l.* towards the Left Hand, and the *Anſwer* is 1 *l.* 16 *s.* 8 *d.* as above.

Example 3.

What is 7 times 21 *d.* ? Or, ſeven Stone of *Beef*,

	s.	*d.*	
At — —— —	1	9	Price
		7	Quantity
	12	3	

Here I ſay, 7 times 9 is 63 *d.* that is 5 *s.* 3 *d.* ſet down 3, and carry 5, and 7 times 1 is 7, and 5 is 12; which makes 12 *s* 3 *d.* for the Anſwer.

Example 4.

What comes 9 ℔. of *Tea* to, at 9 *s.* 9 *d.* ½ *per* Pound?

l.	*s.*	*d.*	*q.*
	9	9	½
			9
4	8	1	½

I ſay here, 9 times 2 is 18, 18 Farthings is 4 *d.* ½, I ſet down ½, and carry 4; then 9 times 9 is 81, and 4 I carry is 85 Pence, which is 7 *s.* 1 *d.* I ſet down 1, and carry 7; then 9 times 9 is 81, and 7 is 88 Shillings, which makes 4 *l.* 8 *s.* I ſet down 8 *s.* and the 4 *l.* out to the Left Hand, as before; and the *Anſwer* is 4 *l.* 8 *s.* 1 *d.* ½, as above.

Example 5.

	l.	s.	d.
What comes 10 times		11	6 to?
Or 10 ℔. of *Nutmegs*, at 11 s. 6 d.			10
	5	15	0

Here 10 times 6 is 60 Pence, which is juſt 5 s. I ſet down 0, and carry 5, then 10 times 11 is 110, and 5 is 115 Shillings, which is 5 l. 15 s. for the *Anſwer*.

Example 6.

		s.	d.
How much is 11 times		17	6
Or 11 *Piſtoles* at *ditto*?			11
	l. 9	12	6

I ſay here, 11 times 6 is 66 Pence, which is 5 s. 6 d. I ſet down 6 and carry 5; then 11 times 7 is 77, and 5 that I carry is 82, I ſet down 2 and carry 8; then 11 times 1 is 11, and 8 is 19; and in regard they are ſo many *Angels* (it being in the Tens of Shillings) I take the Half of them, which is 9, or 9 Pounds, and Ten Shillings over, which I put to the Left of the 2 s. ſet down before, and they make 12 s. and the 9 l. I ſet at a proper Diſtance towards the Left Hand, as in the *Example* may be ſeen.

Example 7.

		s.	d.
What comes 12 *Sheep* to, at		13	4
			12
	l. 8	00	00 *Anſw.*

Note, *'Tis beſt to multiply the Shillings as ſimple Numbers, for every* 10 *carrying* 1, &c. *and then to halve the Tens of Shillings, which half is always ſo many Pounds; and if they halve even, ſet down a Cypher in the Tens of Shillings Place; but if odd, then ſet down a* 1 *in that Place. Inſtances of both may be obſerv'd in the two laſt Sums.*

In the laſt Sum I ſaid, 12 times 4 is 48 Pence, or 4 *s.* I ſet down 0, and carry 4; then 12 times 3 is 36, and 4 is 40, I ſet down 0, and carry 4 for 4 Tens; then 12 times 1 is 12, and 4 is 16, the Half of 16 is 8, which is 8 Pounds for *Anſwer*, as in the Work.

Some more Examples.

	l.	*s.*	*d.*
9 ℔. of *Cinnamon*, at		7	2
			9
Anſw.	3	04	6
8 *C.* of *Sugar*, at		44	4
			8
Here the ½ of 35 is 17 and a ½	17	14	8
12 Pair of *Stockings*, at *per Pair*		9	8
			12
Anſw.	5	16	0
7 *C.* of *Hops*, at	3	06	6
			7
Anſw.	23	05	6

		l.	*s.*	*d.*	*q.*
11 Ounces of *Silver*, at		0	5	5	½
					11
	Anſw.	3	0	0	½

10 Pipes of *Wine*, at	*per Pipe*,	24	15	0
				10
	Anſw.	247	10	0

6 Yards of *Flannel*, at			1	2
				6
	Anſw.		7	0

9 C. of *Tallow*, at		34	6
			9
Here the ½ of 31 is 15 and a ½	15	10	6

XV. When the Quantity exceeds 12, find two Numbers in the *Multiplication Table*, which being multiplied together will make the Quantity: Then multiply the *Price* by one of the Numbers, (it matters not which you multiply firſt by) and then that Product by the other Number, and the laſt Product will be the Anſwer.

Example 1.

		l.	*s.*	*d.*	
What is 18 times Gallons of Brandy at 4 *s.* 6 *d. per* Gallon.			4	6	Or 18
				3	the 1ſt Multiplier.
			13	6	the 1ſt Prod. by 3
				6	the 2d Multiplier.
	Anſw.	4	1	0	the laſt Prod. by 6

Here I find this Quantity hit two ways (as many times it happens) *viz.* either by 3 and by 6, or by 2 and by 9; either of them multiplied together make the Quantity, *viz.* 18.

l.	*s.*	*d.*
	4	6
		2
	9	0
		9
4	1	0

Here is the Anſwer produced by 2 and 9 as above.

Example 2.

	l.	*s.*	*d. q.*
How much is 32 times		15	9 ½
Or, 32 lb. of *Tea*, at			4
15 *s.* 9 *d.* ½ *per* Pound?			
The firſt Product by 4,	3	03	2
The ſecond Multiplier,			8
Anſw.	25	05	4

Here the Numbers are 4 and 8; 4 times 8 making 32, the Quantity; wherefore I begin, and ſay, 4 times 2 is 8 Farthings, which being juſt Two-pence, I carry it to the Pence; then 4 times 9 is 36, and 2 is 38 Pence, which is 3 *s.* and 2 *d.* I ſet down 2, and carry 3 *s.* &c. After I have multiplied by 4, I find that Product to be 3 *l.* 3 *s.* 2 *d.* which I multiply by 8, the other Number, and find the laſt Product, or Anſwer, to be 25 *l.* 5 *s.* 4 *d.* as in the Work may be ſeen.

What is 120 times
Or 120 Quarters of
Corn, at 19*s.* 8*d.*
per Quarter?

	l.	*s.*	*d.*
		19	8
			10
	9	16	8
			12
Anſw.	118	00	0

Here 10 times 12 makes 120 the Quantity; wherefore I multiply firſt by 10, and that Product is 9*l.* 16*s.* 8*d.* which I multiply by the other Number 12, and that produces 118*l.* for the Anſwer.

77 *C.* of *Madder,* at

	l.	*s.*	*d.*
	3	15	6
			7
	26	08	6
			11
Anſw.	290	13	6

Here 11 times 7 makes the Quantity; when I come to multiply by the ſecond Multiplier, *viz.* 11. I ſay, 11 times 6 is 66, which is 5*s.* 6*d.* I ſet down 6, and carry 5; then 11 times 8 is 88, and 5 is 93*s.* which is 4*l.* 13*s.* I ſet down 13 and carry 4; then 11 times 6 is 66, and 4 is 70, I ſet 0, and carry 7 for the ſeven Tens; then 11 times 2 is 22, and 7 is 29, &c.

More Examples.

15 Yards of *Ribbon,* at

	l.	*s.*	*d.*
		2	1
			3
		6	3
			5
Anſw.	1	11	3

Here 3 times 5 is 15, the Quantity,

21 Yards

	l.	s.	d.
21 Yards of *Tabby*, at		5	11
			7
Here 7 times 3 is 21 the Quantity.	2	01	5
			3
Anſw.	6	04	3

	l.	s.	d.
72 Gallons of *Wine*, at		5	4
			6
Here 6 times 12 makes 72, the Quantity, or 8 times 9 makes 72 likewiſe	1	12	0
		—	12
Anſw.	19	04	0

	l.	s.	d.	q.
81 lb. of *Nutmegs*, at		12	3	$\frac{3}{4}$
				9
Here 9 times 9 makes the Quantity	5	10	9	$\frac{3}{4}$
				9
Anſw.	49	17	3	$\frac{3}{4}$

XVI. When the Quantity is ſuch a Number, that no two Numbers in the Table can be found to anſwer it, then multiply by two ſuch Numbers as come neareſt to the Number given, as before; and for the Number wanting, to make up the Number given, multiply the Price of one by the Number that is wanting, and add it to the other Product, and the Total will be the Anſwer.

Example 1.

Example 1.

	l.	*s.*	*d.*
39 C. of *Currants*, at *per C.*	2	13	6
			6
	16	01	0
			6
The Price 2 *l.* 13 *s.* 6 *d.* multiplied by 3	96	06	0
	8	00	6
Anſw.	104 -	06	6

Here I find the two Numbers that come the neareſt, are 6 times 6, by which I multiply as before, and the laſt Product is 96 *l.* 6 *s.* 0 *d.* but 6 times 6 is but 36, and the Quantity is 39, ſo that there is 3 *C.* wanting; wherefore, I multiply the Price 2 *l.* 13 *s.* 6 *d.* by 3, and it produces 8 *l.* 00 *s.* 6 *d.* to be added to the laſt Product 96 *l.* 6 *s.* 0 *d.* which together make 104 *l.* 6 *s.* 6 *d.* for the Anſwer.

	l.	*s.*	*d.*
79 Firkins of *Butter*, at	00	17	6
			7
	6	02	6
			11
Here the two Numbers that come neareſt, are 7 times 11, which is 77,	67	07	6
The Price multiplied by (2) that are wanting,	01	15	0
Anſw.	69	02	6

More

More Examples.

		l.	*s*	*d.*
57 Groſs of *Pipes*, at	*per Groſs*		1	4
				7
			09	4
				8
		03	14	8
1 Groſs wanting,		00	01	4
	Anſw.	03	16	0
76 *C.* ¾ of *Ship Biſket*, at			13	6
				6
		4	01	0
				12
		48	12	0
The Price multiplied by 4		02	14	0
The ½ of 13*s.* 6*d.* for ½ *C.*		00	06	9
The ¼ of *ditto*, for the ¼ *C.*		00	03	4 ½
	Anſw.	51	16	1 ½
87 Ells of *Holland*, at			3	5 ½
Here 7 times 12 is 84, and 3 is 87				7
		1	04	2 ½
				12
		14	10	6
The Price multiplied by 3			10	4 ½
	Anſw.	15	00	10 ½

If I had multiplied by 11 times 8, which is 88, and ſubtracted the Price of 1 from the Product, the Remainder would have been the Anſwer, as before.

		l.	*s.*	*d.*
97 *C.* ½ of *Cheeſe*, at	*per C.*		25	6
				8
		10	4	0
				12
		122	08	0
For the 1 *C.* wanting		1	05	6
The Half of the Price for the Half *C.*			12	9
	Anſw.	124	06	3

Thus by the various *Examples* foregoing, is manifeſtly ſeen, That when the Price of one Thing is given, the Price of many, (at the ſame Rate) may be found by *Multiplication* only; and ſooner, and much handſomer than by the *Rule of Three.*

Large Sums may be caſt up this Way, as well as ſmall, obſerving the Directions following.

When your Sum is 1, 2, 3, 4, or more hundreds, always multiply the Price by 10, and then that Product by 10 alſo, which produces the Value of one Hundred; then multiply that Product by the Number of Hundreds, whether 2, 3, 4, or 5, *&c.* and that Product is the Value of ſo many Hundreds as there are; then for the Tens, whether 20, 30, 40, *&c.* multiply that Product which gives the Price of 10, either by 2, 3, 4, or 5, as the Tens ſhall happen, which Place under the laſt Product, without drawing a Line; and for the Units always multiply the Price by them, whether 2, 3, 4, &c. and ſet that alſo juſt under the former Products, ſo that you will have three Lines to add together, and the Total of them is always the Anſwer. An *Example*, or two, will make it eaſy to be underſtood.

Example 1.

Example 1.

	l.	*s.*	*d.*	
What is 648 times		4	6	
Or 684 ℔. of *Indigo,* at *ditto?*			10	
The Value of [10]	2	05	0	
			10	
The Value of [100]	22	10	0	
The Number of Hundreds			6	
The Value of [600]	135	00	0	600
The Price of [10] mult. by [4]	9	00	0	40
The Price multiplied by [8]	1	16	0	8
Anſw.	145	16	0	648

Firſt I multiply 4*s.* 6*d.* the Price, by 10, and that produces 2*l.* 5*s.* for the Price of 10; alſo I multiply the ſaid 2*l.* 5*s.* for the Price of 10, by 10 again, and that produces 22*l.* 10*s.* for the Value of 100; then I multiply the Value of 100, by 6, the Number of Hundreds, and that Product is the Value of 600, being 135*l.* 00*s.* 00*d.* wherefore I am only now to find out the Value of 48; For the four Tens in 48, I multiply the Price of 10, *viz.* *l.* 2 : 05 : 0, by 4, and that Product ſhews the Value of 40, which is 9*l.* Then for the 8 Units in the 48, I multiply the firſt Price, *viz.* 4*s.* 6*d.* by 8, and that Product gives the Value of 8, which is 1*l.* 16*s.* All which being added together, (that is, only the three Lines that have no Line of Separation between them) make 145*l.* 16*s.* 0*d.* for Anſwer.

And thus may any Sum be done, let it be as large as it will; only when the Sum conſiſts of Thouſands, you have 4 Lines to add together, but when but of Hundreds, then but three.

Example 2.

	l.	*s.*	*d.*	
355 Ells of *Holland*, at		2	3 ½	
			10	
The Value of [10]	1	02	11	
			10	
The Value of [100]	11	09	2	
			3	
The Value of [300]	34	07	6	300
The Value of 10 mult. by [5]	5	14	7	50
The Price by 5 Units	0	11	5 ½	5
Anſw.	40	13	6 ½	355

Example 3.

	l.	*s.*	*d.*	
966 ℔. of *Bohea Tea* at		14	5	
			10	
The Value of [10]	7	04	2	
			10	
Ditto of [100]	72	01	8	
The Number of Hundreds			9	
The Value of [900]	648	15	0	900
The Value of 10 mult. by [6]	43	05	0	60
The Price of 1 mult. by [6]	4	06	6	6
Anſw.	696	06	6	966

Example

Example 4.

	l.	*s.*	*d.*	
8954 Gallons of *Rum*, at		03	5	
			10	
The Price of (10)	1	14	2	
			10	
The Price of (100)	17	01	8	
			10	
The Price of (1000)	170	16	8	
The Number of Thouſands			8	
The Value of 8000	1366	13	4	8000
The Value of (100) mult. by 9,	153	15	0	900
The Value of (10) mult. by 5,	8	10	10	50
The Price mult. by 4 Units	0	13	8	4
Anſw.	1529	12	10	8954

I have inſiſted the longer on this excellent Method, that it might be well underſtood; not only for its elegant, expeditious, and facile Diſpatch of ordinary Affairs; but for its Utility in contracting many Operations in other Rules, as the *Rule of Three*, &c.

I know it is not cuſtomary to introduce any thing of this kind to be learnt ſo early; imagining (it may be) the Scholar not capable of underſtanding them, 'till he has made farther advances in *Arithmetick*; but ſince they are only *Multiplication*, the foregoing Methods properly belong to the *Rule*, and may well be taught in it, eſpecially ſince they are of ſuch excellent uſe in all manner of Buſineſs; and may be of Service to ſome, whoſe Leiſure or Ability admit of no larger Improvements in *Arithmetick*, Quantities of Weight, Meaſure, *&c.* are expeditiouſly found by this Method of multiplying by Component Parts.

Examples.

In 64 Barrels of *Anchovies*, each 30 ½ lb.
how many Pounds? Multiply 8 and 8

Anſw. 1952

In 56 Firkins of *Butter*, each 56 lb.
how many Pounds? Multiply by 7 and 8.

Anſw. 3136

C. *qrs.* lb.
In 98 Caſks of *Capers*, each 3 3 14
how many Hundreds, *&c.* 10, 9 and 8

Anſw. 379 3 0

In 104 Bars of *Spaniſh Silver*, each 46 ¼ *Oz.*
how many *oz?* 10, 10 and 4

Anſw. 4810 Ounces

In 48 Packs of *Linen*, each 4225 Ells *Fl.*
how many Ells *Flemiſh?* Mult. by 6 and 8

202800

I might here alſo ſhew the Method of *Croſs Multiplication*; or multiplying *Shillings* and *Pence* by *Shillings* and *Pence*; or *Feet* and *Inches*, by *Feet* and *Inches*; (it being all one) and ſome other Methods in *Practical Multiplication*; but there being too much of *Diviſion* uſed with them, I ſhall defer them till I come to another Place.

CHAP.

CHAP. V.

DIVISION,

I. IS a *Rule*, by which we diſcover how often one Number is contained in another; as if it were aſked, How often is 8 contained in 48; The Anſwer would be 6 times. It likewiſe ſerveth to bring ſmall Denominations into greater; as *Farthings* into *Pounds*, and *Pounds Weight* into *Tuns Weight*, *&c.*

II. This *Rule* is comprehended under Three certain Branches, and one uncertain, *viz.*

1. The *Dividend*, or Number given to be divided.
2. The *Diviſor*, or Number given to divide by.
3. The *Quotient*, or Number of equal Parts, ſhewing how often the *Diviſor* is contained in the *Dividend*.
4. The *Remainder*, after the Work is ended; which is always of the ſame Number or Quality with the *Dividend*; and muſt be leſs than the *Diviſor*, if the Work be right: And this is the uncertain Branch, becauſe there is ſometimes a *Remainder*, and ſometimes not.

III. *Diviſion* is either Single or Compound. Single, when the *Diviſor* conſiſteth of one Figure only, and the *Dividend* of two at the leaſt. Any thing of this Kind is anſwered by the *Multiplication Table*; as if 54 were to be divided by 6, the Anſwer would be 9; for 6 is contained 9 times in 54: Here 54 is the *Dividend*; 6 the *Diviſor*; and 9 is the *Quotient*, or Anſwer.

IV. *Compound Diviſion* is when the *Dividend* conſiſteth of many Places or Figures, and the *Diviſor* of one or more Figures. As if 365, the Days in a Year, were to be divided by 7, the Days in a Week; 365 is the *Dividend*, 7 is the *Diviſor*, 52 the *Quotient*, and 1 the *Remainder*.

Dividend.
Diviſor 7)365(52 *Quot.*
35

15
14
---
(1) *Remainder*

A General Rule for the Working.

N. B. { 1 *Seek*, 2 *Multiply*, 3 *Subtract*.

This *Rule* comprehends Three of thoſe foregoing; and is accounted the hardeſt Leſſon of *Arithmetick*; but I ſhall, by plain *Rules* and familiar *Examples*, render it eaſy to the meaneſt Capacity. And as in *Multiplication*, ſo in this *Rule*, I ſhall endeavour at ſome new Improvements; diſcovering that many Things in this *Rule*, may be abridged, and ſhew its excellent Uſe in anſwering many Queſtions, which ſeem to require a more progreſſive Knowledge in *Arithmetick*.

Example 1.

Let it be required to divide 7420 by 5; in order to which, I place my *Dividend*, or Sum to be divided, into 4 equal Parts, or Shares thus, 7 4 2 0. Then I place my *Diviſor* 5, before the *Dividend*, with a crooked Line before it, and a ſtrait Line drawn underneath it thus;

5)7420

Then I proceed according to the *Rule*; and firſt I *ſeek*, ſaying, how many times 5, the *Diviſor*, can I have in 7, the firſt Figure of the *Dividend*, and the Anſwer is once, which 1 I place under the Line juſt under the 7; then according to the *Rule*, I multiply, ſaying, once 5, (the *Diviſor*) is 5; then as the *Rule* directs, I ſubtract, ſaying, 5 from 7, and there remains 2, which are 2 Tens, which I ſuppoſe to ſtand before the next Figure in the *Dividend*, *viz.* 4, and ſo makes it 24,

5)7420

1

for a new *Dividend*. Then again I *ſeek*, ſaying, how many times 5, the *Diviſor*, can I have in 24 the *Dividend?* And the Anſwer is 4 times, which I place under the Line juſt under 4 the ſecond Figure in the *Dividend*, then I multiply, ſaying, 4 times 5, the *Diviſor*, is 20, which I ſubtract from 24, and there reſts 4, which being 4 Tens, makes the next Figure 2, in the *Dividend*, to be 42. Then again I ſeek how many times 5 I can have in 42, and the Anſwer is 8 times, which I put under the Line juſt under 2, the Figure in the *Dividend*; then I multiply, ſaying, 8 times 5 is 40, which I ſubtract from 42, and there remains 2, which 2 Tens make the Cypher in the *Dividend* to be 20; then I ſay, how many times 5, the *Diviſor*, in 20, and the Anſwer is 4 times; then 4 times 5, the *Diviſor*, is 20, from 20, and there remains nothing, and ſo the Work is done; as by the following *Example.*

Diviſor 5)7420(*Dividend.*

1484 *Quotient*, or *Anſwer.*

So that I find by the Work, that 5 is contained in 7420 juſt 1484 times: Or if the *Dividend* had been ſo many *Shillings* or *Pounds*, to be parted among 5 Perſons, each Perſon muſt have had ſo many *Shillings*, or *Pounds*, for his Share.

V. **When the firſt Figure of your** ***Dividend*** is leſſer than the *Diviſor* or firſt Figure of your *Diviſor*, then make the two firſt Figures of the *Dividend*, your *Dividual*, and work as before.

Example.

Divide 4263 Gallons of *Wine* among 7 Perſons: Having ſet down the *Dividend*, for the Work as before, with the *Diviſor* before it, thus,

7)4263(*Dividend*

609 *Quot.*

I proceed, ſaying, How many times 7, the *Diviſor*, can I have in 4, the firſt Figure of the *Dividend*; and knowing I cannot take 7 out of 4, I take it out of 42, the two firſt Figures of the *Dividend*, and the Anſwer is 6 times, which I put juſt under 2, the ſecond Figure of the *Dividend*, and then multiply, ſaying, 6 times 7, the *Diviſor*, is 42, from 42, and there remains nothing. Then the Sevens that are in 6 (for you muſt never take more than one Figure, or Cypher, at a time out of the *Dividend*, except you are obliged to do it at firſt) I cannot take, wherefore I put a Cypher in the *Quotient*, under 6, and the 6 remains as ſo many Tens, and makes the next or laſt Figure in the *Dividend* 3, to be 63; then the Sevens in 63, 9 times, and the Work is done; and the *Quotient* is 609, or 609 Gallons for each Man's Share.

The Proof.

To prove this or any other Sum in *Diviſion*, multiply the *Quotient* by the *Diviſor*, and if the *Product* is like the *Dividend*, the Work is right: But obſerve, whenever there is a *Remainder*, ſuch *Remainder* muſt be taken in, or added to the *Product*.

Example.

7)4263

609
7

4263 *Proof*

Here I ſay, 7 times 9 is 63, 3 and carry 6, then 7 times 0 is nothing, but 6 is 6; laſtly, 7 times 6 is 42; ſo that I find this *Product* to be the very ſame Figures with the *Dividend*; therefore the Work is right.

So likewiſe as *Multiplication* proves *Diviſion*, doth *Diviſion* prove *Multiplication*. For if you divide the *Product* by the *Multiplier*, the *Quotient* (if the Work is right) will be the ſame with the *Multiplicand:* As thus:

In proving the laſt Sum, 609 is the *Multiplicand*, and 4263 is the *Product*, and 7 the *Multiplier*. Now if the *Product* 4263 be divided by 7 the *Multiplier*, the *Quotient* will be 609 the *Multiplicand*, as may be ſeen in the foregoing Work.

Example.

Divide 97961 Pieces $\frac{1}{8}$ among 9 Men.

9)97961

10884 $\frac{5}{9}$ *Anſwer*
9

97961 *Proof*

Here I ſay, the Nines in 9, once; which I put under the Line, juſt under 9 in the *Dividend*, and then I multiply, ſaying, once 9 from 9, and there remains nothing; then the Nines in 7 none; wherefore I ſet down a 0, in the *Quotient*, juſt under 7, and the 7 remains, and makes the next Figure 9 in the *Dividend*, to be 79; then the Nines in 79, are 8, then 8 times 9 is 72, from 79, and there reſts 7, which makes the next Figure 6, in the *Dividend*, to be 76; then the Nines in 76 are 8; 8 times 9 is 72, from 76, and there reſts 4, which makes the next and laſt Figure in the *Dividend* to be 41; then the Nines in 41 are 4; 4 times 9 is 36, from 41, and there reſts 5, which is the *Remainder*; which may be ſet at ſome ſmall Diſtance from the *Quotient*, towards the Right Hand, with the *Diviſor* 9 under it, thus, $\frac{5}{9}$. So that there are 5 *Pieces* $\frac{1}{8}$ over, beſides 10884, that comes to each Man's Share, and is called a *Fraction*, and ſignifies that each Perſon ought to have 5 Ninths of a *Piece of Eight* more to his Share.

What hath been already ſaid for Inſtruction, to divide by a ſingle Figure, I think ſufficient to any intelligent Perſon; and therefore ſhall only add ſome *Examples* for the Learner's Practice, and ſo proceed forward in the Rule.

Examples for Practice.

	Divid.			
Diviſor	6)9654	7)4702	5)44044	
Quot.	1609	671 $\frac{5}{7}$	8808 $\frac{4}{5}$	*Rem.*
	4)57802	9)345678	6)407060	
	144750 $\frac{2}{4}$	38408 $\frac{6}{9}$	67843 $\frac{2}{6}$	

Diviſor	7)89012	8)98765	9)4567097
Quot.	12716	12345 $\frac{5}{8}$	507455 $\frac{2}{9}$
	7	9	9
Proof	89012	98765	4567097

Note, *There can be no ſhorter Way, nor a more regular Method of dividing by a ſingle Figure, than by the* Examples *foregoing.*

As in *Multiplication*, we multiply by 11 and 12 at once, to have the Product in one Line, ſo in this Rule 'tis moſt expeditious and commendable to divide by the above-mentioned Numbers, as by a ſingle Figure, as in the following *Examples.*

By	11)45678	11)379600
Quotient	4152 $\frac{6}{11}$	34509 $\frac{1}{11}$
By	12)42697	12)3967040
Quotient	3558 $\frac{1}{12}$	330586 $\frac{8}{12}$
	12	12
Proof	42697	3967040

In the firſt *Example* I ſay, the Elevens in 45, 4 times; the Elevens in 16, once; the Elevens in 57, 5 times; the Elevens in 28, twice; and there remains 6; and the *Quotient* is 4152; as by the *Example.*

In the third *Example*, where I divide by 12, I ſay the Twelves in 42, 3 times; the Twelves in 66, 5 times; the Twelves in 69, 5 times; the Twelves in 97, 8 times, and there remains 1; and the *Quotient* is 3558; as by *Example.*

In like manner you may divide by theſe Numbers, *viz.* 110, 120, 1100, or 1200, *&c.* cutting off the Cypher, or Cyphers, with a downright Stroke of the Pen; and alſo as many Figures or Cyphers, towards the Right Hand, in the *Dividend*, which will be the Remainder, or Part of it, as in the following

Examples.

Divide by 11|0)8097|4 12|00)2880|00

Quotient 736 $\frac{14}{110}$ 240
110

Proof 80974

VI. *Contractions*, or how to divide by 10, 100, 1000, or 10000, *&c.* ſo many Cyphers as you have in your *Diviſor*, cut off with a Stroke ſo many Figures, or Cyphers from your *Dividend*, from the Right Hand towards the left; and the Work is done. The Figures on the Left Hand of the Stroke is the *Quotient*; and thoſe on the Right the *Remainder*; as in theſe *Examples.*

Q. R. *Q. R.* *Q. R.*
1|0)36|5 1|00)749|60 1|000)567|890
10 100 1000

Quot.
1|0000)7496|4600 Remains.

VII. When the *Diviſor* conſiſts of ſeveral Figures, then ariſes the greateſt Difficulty in the Work of *Diviſion*; but I ſhall give ſuch plain Directions, which if heedfully attended, and obſerved, will render it very eaſy.

Example 1.

Example 1.

Let it be required to divide 78901 by 32. In order to the Work, I place the Numbers down with two crooked Lines, one behind the *Diviſor*, and the other before the *Quotient*; thus:

Divid. Quotient.
Diviſor 32)78901(. . . . .
.

Thus I ſet out as many Figures towards the left Hand of the *Dividend*, as there are Places in the *Diviſor*, by making a *Point* under 8, as above; then remembring the *General* Rule, viz. to *Seek*, *Multiply*, and *Subtract*, I begin, ſaying, how many times 3, the firſt Figure of the *Diviſor*, can I have in 7, the firſt Figure in the *Dividend*, and the Anſwer is twice; wherefore I ſet down 2 in the *Quotient*, thus 32)78901(2. Then according to Rule, I multiply the *Diviſor* 32 by 2, the times I take, ſaying, twice 2 is 4, which I ſet down under 8 in the *Dividend*; then twice 3 is 6, which I place under 7 in the *Dividend*; then I draw a Line, and according to Rule, ſubtract 64 from 78, and there remains 14; as in the firſt Step of the Work may be ſeen, ſtanding thus:

32)78901(2
64
—
14

Then I make a *Point* under the next Figure, to wit, 9, and bring it down, ſetting it on the Right Hand of the *Remainder* 14; and then there is 149 for a new *Dividend*, and ſtands thus;

32)78901(2
.
64

149

Then again I ſeek how oft I can have 32, the *Diviſor*, in 149 the *Dividual*; but ſince that is too hard to reach by the Mind, there being one Figure more in the *Dividual* than in the *Diviſor* (for there never ought to be more than one) I ſeek how often I can have 3, the firſt Figure of the *Diviſor*, in 14, the two firſt Figures in the *Dividual*, and I find I can have 4 times, wherefore I put 4 in the *Quotient*, and multiply the *Diviſor* 32, by 4, the Figure placed in the *Quotient*, ſaying, 4 times 2 is 8, which I ſet under 9; then 4 times 3 is 12, which I put under 14, and then ſubtract 128 from 149, and there remains 21; (*Note*, After any *Subtraction*, there muſt never remain ſo much as the *Diviſor*, for if there doth, you have made an Error, by taking a Time too little, which muſt be rectified before you proceed any further); then I make a Point under the next Place in the *Dividend*, which is a Cypher, and bringing it down, ſet it on the Right of the Remainder 21, and it makes 210, for a *Dividend*; after this ſecond Step, the Work ſtands thus;

32)78901(24
. .
64

149
128

210

Then again I ſeek how oft I can have 32, the *Diviſor*, in 210, or how oft, (becauſe there is one Figure more in the *Dividual*, than in the *Diviſor*) I can have 3, the firſt in the Diviſor, out of 21, the two firſt Figures in the Dividual, and the Anſwer is 7 times: But I muſt obſerve, not to take the firſt Figure any more times than I can the next. Wherefore I try if I can take all the Figures 7 times, by multiplying 32 the Diviſor by 7, and note its Product on Paper, or in my Mind, only by obſerving the two laſt Figures, whether it be not too big to ſubtract from the Dividual, and I find it is, for I cannot take 224 (the Product of 32 by 7) out of 210 the Dividual, wherefore I take a time leſs, *viz.* but 6, and put that in the Quotient, and ſay, 6 times 2 is 12, 2 and carry 1, and 6 times 3 is 18, and 1 is 19, and then I have 192 to take out of 210, and there reſts 18. Then I make a Point under the laſt Figure of the Dividend, 1, and bring it down to the Remainder 18, and it makes 181, and the Work ſtands thus;

```
32)78901(246
     . . .
   64
   ---
   149
   128
   ---
    210
    192
    ---
     181
```

Then I ſeek how often I can have 32 out of 181, or how oft 3 in 18, and the Anſwer is 6 times; but on trial I find that too much; and therefore I take but 5 times, and ſet 5 in the Quotient, and multiply the Diviſor 32 by 5, and find that the Product is 160, to be ſubtracted from 181, and the Remainder is 21, and ſo the Work is finiſhed, and the Quotient is 2465, and the Remainder 21; which ſhews that 32 is contained in 78901, 2465 times, and 21 over. *See the Work.*

Dividend
Diviſor, 32)78901(2465 *Quotient.*
64
149
128
210
192
181
160
(21) *Remainder.*

Example 2.

Divide 16790 Days by 365
Quotient.
365)16790(46 Years
1460
2190
2190
(0)

In the *Example* above, I find I cannot take the firſt Figure of the *Diviſor* out of the *Dividend*; wherefore I ſay, How often three in 16? Upon Trial, I find 5 times too much, wherefore I ſet 4 in the *Quotient*, and ſay 4 times 5 is 20, I ſet down 0 under 9, in the *Dividend*, and carry 2, ſaying, 4 times 6 is 24, and 2 is 26, 6 and carry 2; then 4 times 3 is 12, and 2 is 14; which Product of 1460 I ſubtract out of the *Dividual* 1679, and there remains 219, to which I bring down the Cypher out of the *Dividend*, and it makes 2190 for a *Dividual*, *&c. See the Work above.*

Example 3.

Example 3.

Divide 345678901 by 2345. In order to the Work, I ſet it down thus;

2345)345678901(

In this Sum are four Places in the Diviſor, wherefore I make a Point under the 4th Figure in the Dividend, *viz.* under 6 for my firſt Dividual; but if the firſt Figure in the Diviſor had been bigger than the firſt in the Dividend, then I muſt have made the Point under the 5th Figure in the Dividend, to wit, under the 7; and then have tried how oft the firſt Figure in the Diviſor could have been taken out of the two firſt Figures in the Dividend.

But to proceed, I firſt ſeek how oft I can have 2, the firſt of the Diviſor, out of 3, the firſt Figure of the Dividend, which is once, wherefore I put one in the Quotient, and multiply the Diviſor 2345 by 1, ſetting the Product juſt under the firſt Dividual, and ſubtract according to Rule, and then the Work ſtands thus:

```
2345)345678901(1
     2345
     ----
     1111
```

Note, *You muſt never bring down more than one Figure or Cypher at a Time out of the* Dividend, *and for every Figure or Cypher brought down, there muſt be one, or a Cypher put in the Quotient.*

Then I make a *Point* under the next Figure in the Dividend, *viz.* 7, and bring it down, placing it on the Right of the Remainder 1111, and then I have 11117 for a Dividual, which contains one Figure more than the Diviſor; wherefore I take the firſt Figure of the Diviſor out of the two firſt Figures of the Dividual, *viz.* 2 out of 11, ſaying, the Two's in 11, 5 Times; but on Trial, I find I cannot take five times thro' the whole Diviſor; for when I multiply the Diviſor by 5, I find its Product to be 11725, which cannot be taken out of 11117, that is, I cannot take 117 out of 111, wherefore I take one leſs, and ſet 4 in the Quotient, by which I multiply the Diviſor 2345, and find its Product 9380, which ſubtracted from 11117, leaves 1737 for the Remainder; to which I bring down the next Figure of the Dividend, *viz.* 8, and annex it on the Right Hand, and then there is 17378 for a Dividual, and the Work ſtands thus;

```
2345)345678901(14
         . .
   2345
   ----
   11117
    9380
   -----
    17378
```

Then I ſeek how oft I can have 2 in 17, and the Anſwer is 8 times, but on Trial I find it too much; wherefore I ſet 7 in the Quotient.

Note in general, *When you are upon Trial for the Times you can take, you need only mind the two laſt Figures of the Product towards the left Hand; for if you can take them out of the two firſt of the Dividual, it will moſt commonly bear the Times you take.*

Having ſet 7 in the Quotient, I multiply the Diviſor by it, and the Product is 16415, which I ſubtract from 17378, and the Remainder is 963; to which I bring down the next Figure in the Dividend, *viz.* 9, and then I have 9639 for a Dividual, and then the Work will appear as follows.

```
2345)3456789 01(147
      . . .
     2345
     ----
     11117
      9380
     -----
      17378
      16415
     ------
       9639
```

Here this laſt Dividual hath an equal Number of Figures with the Diviſor, *viz.* Four; wherefore I ſeek how often I have 2, the firſt Figure of the Diviſor, out of 9, the firſt of the Dividual, and the Anſwer is 4 times, which I put in the Quotient, and then multiply the Diviſor by it, and the Product is 9380, which ſubtracted from 9639, the Remainder is 259, to which I bring down the laſt Figure out of the Dividend, *viz.* 1, and then there is 2451 for the laſt Dividual, and then I ſeek again, and I find I can take but once; wherefore I ſet another 1 in the Quotient, and work as before; and I find the Remainder 106, and ſo the Work is finiſhed, as by the whole Operation in the following Page.

The Proof.

To prove the following Sum, or any other Sum in this *Rule*, multiply the Quotient by the Diviſor, and if there be a Remainder, it muſt be taken in as you multiply, and if the Product is like the Dividend, the Work is right, as may alſo be ſeen in the *Example*.

2345)345678901(
2345
11117
9380
17378
16415
9639
9380
2590
2345
2451
2345
(106)

147411
2345
737061
589644
442234
294832
(345678901 *Proof.*

7
5 X 0 } *Proof.*
7

In proving (after I have ſet the Diviſor under the Quotient, as in the *Example)* I ſay 5 times 1 is 5, and 6 that remains in the Units Place of the Remainder, is 11, 1 and carry 1, *&c.* When I come to the third Figure in the Multiplier I take in the 1 that ſtands in the Place of Hundreds in the Remainder, as 3 times 1 is 3, and 1 is 4, *&c.*

Diviſion may alſo be proved by the Croſs, as in *Multiplication:* For Trial, let us prove the foregoing Sum thus:

7
5 X

Firſt caſt the Nines out of the Diviſor, and there remains 5, which I place on the Left of the Croſs (as you ſee in the Margin) then out of the Quotient and there remains 0, which I ſet on the Right of the Croſs; then I multiply theſe two together, and they make 0; but the Nines muſt have been caſt out there alſo, if by multiplying them together they had made any, and what was over, carried to the *Remainder*, which here makes 7, which I ſet on the Top, as in the Margin. Laſtly, I caſt away the Nines out of the Dividend, and there reſts 7 alſo, which I put underneath the Croſs, and finding the Top and Bottom Figures to be alike, I conclude the Work is right.

The foregoing Directions to the preceding *Examples*, are ſo plain and eaſy, that there is no Occaſion for any more; ſo I ſhall ſet down ſome more *Examples*, without any verbal Directions, thinking what hath been already ſaid to that Purpoſe, to be ſufficient.

More Examples.

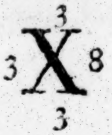
Diviſor 14)5873456(419532 *Quotient*

```
    56
    --
    27
    14
    ---
    133         2
    126       5 X 6
    ---         2
     74
     70
     --
     45
     42
     --
      36
      28
      --
     (8)
```

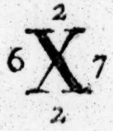
47)27072329(576007

```
    235
    ---
    357         5
    329       2 X 7
    ---         5
    282
    282
    ---
      329
      329
      ---
      (0) Remainder.
```

Diviſor 426)7890123(18521
. . . .
426
3630
3408
2221
2130
912
852
603
426
(177)



96)7400900(77092
. . . .
672
680
672
890
864
260
192
(68)



Here follow ſome other Sums, with their *Quotients* and *Remainders* only; their Working being purpoſely omitted; leaving that to the Learner for a Trial of his Ingenuity.

As if you divide 796976499, by 49654, the *Quotient* will be 16050, and the *Remainder*, after the Work is ended, 29799.

Again, if you divide 5345678905, by 765432, the *Quotient* will be 6983, and the *Remainder*, 667249.

Alſo, if you divide 456789012345, by 9876543, the *Quotient* will be 46249, and there will be a *Remainder* of 8775138.

And if you divide 123456789012, by 123456789, there will be for the *Quotient* 1000, and for the *Remainder* 12.

And that nothing may be wanting to a perfect Underſtanding of this *Rule*, I have ſubjoined the following *General Notes*, *concerning* Diviſion.

1*ſt*, So many Places as are in your *Diviſor*, you point off ſo many in your *Dividend*, for your firſt *Dividual*, except the firſt Figure of the *Diviſor* exceed the firſt of the *Dividend*, and then you move a Place farther towards the right Hand, and make your Point there; and then your *Dividual* mark'd out, hath a Figure more than your *Diviſor*; and then you muſt take the firſt Figure of your *Diviſor* out of the two firſt Figures of your *Dividual*.

2dly, You never place a Cypher in the *Quotient* the firſt time you ſeek.

3dly, The times that you take the *Diviſor* out of the *Dividend* never exceed 9.

4thly, The *Dividual* never exceeds the *Diviſor* above one Figure.

5thly, You never bring down but one Figure or Cypher at a time, out of the *Dividend*.

6thly, For every Figure or Cypher brought down from the *Dividend*, there muſt be one, or a Cypher placed in the *Quotient* alſo.

7thly, When you cannot take the Diviſor out of the Dividual, you muſt put a Cypher in the Quotient, and take another Figure from the Dividend: And if, again, you cannot take it, place another Cypher in the Quotient, and then ſeek again.

8thly, When, at any time, after you have ſubtracted, there remains nothing, and yet there remains a Cypher, or Cyphers in the Dividend, it or them muſt be put in the Quotient as Part of it, and the Work is done; and there will be no Remainder.

The ſhort ITALIAN *Way of* DIVISION.

There is another Way of *Diviſion* ſhorter than the foregoing, becauſe you omit ſetting down the ſeveral Products of your *Multiplication*, but multiply and ſubtract together; and is like the common *Scratch* or *Cancelling* Way of *Diviſion*, only you are not at the Trouble of removing your Diviſor every time you ſeek, as in that Way you are.

Example.

Example.

Let us divide the ſecond *Example* in Page 100, by this (as it is called) ſhort *Italian* Way; *viz.* Divide 16790 Days by 365. In order to the Work, I ſet it down as before, thus;

365)16790(46

2190

(0)

Here I ſeek (as before) how oft I can have 3 in 16 (my Point being under 9, for the Dividual) and I find I can have but 4 times; wherefore I put 4 in the Quotient, and multiply the Diviſor (as before) ſaying, 4 times 5 is 20, but I do not ſet down a 0, and carry 2, as in the other Way; for the Product muſt not be ſet down, as was ſaid before, but forthwith ſubtract, ſaying, 4 times 5 is 20, 20 from 9 I cannot, but 20 from 29 (borrowing two Tens) and there remains 9, which I ſet under the Line; then 4 times 6 is 24, and two that I borrowed is 26, from 7 I cannot, but 26 from 27 and there remains 1, which I alſo ſet down; then 4 times three is 12, and 2 that I borrow is 14, from 16 and there remains 2, which I place under the Line; then there is a Remainder of 219, to which I bring down the Cypher out of the Dividend, and then I have the laſt Dividual 2190; then I ſay the 3's in 21, 6 times, by which I multiply the Diviſor, ſaying, 6 times 5 is 30, from 0 I cannot, but 30 from 30 (borrowing 3 Tens) and there reſt 0; then 6 times 6 is 36, and 3 that I borrowed is 39, from 9 I cannot, but 39 from 39 and there remains 0; then 6 times 3 is 18, and three that I borrowed is 21, from 21 and there remains 0, and ſo the Work is done.

Let another *Example* be this: Divide 345678901 by 2345, which is the third *Example* in Page 101.

2345)345678901(1

11117

Here I ſay, once 5 is 5, from 6, and there remains 1, &c. then I bring down the 7, and ſet 4 in the Quotient, and ſay, 4 times 5 is 20, from 7 I cannot, but 20 from 27 and there remains 7. Then 4 times 4 is 16, and 2 that I borrowed, is 18, from 1 I cannot, but 18 from 21, and there remains 3. Then 4 times 3 is 12, and 2 is 14, from 1 I cannot, but 14 from 21, and there remains 7. Then 4 times 2 is 8, and 2 is 10, from 11, and there remains 1; ſo that there remains 1737, to which I bring down the next Figure 8, for the Dividual, and the Work ſtands thus:

2345)345678901(14

11117

17378

Again, I ſeek, and put 7 in the *Quotient*, and ſay, 7 times 5 is 35, from 8 I cannot, but 35 from 38, and there remains 3. Then 7 times 4 is 28, and 3 that I borrowed is 31, from 7 I cannot, but 31 from 37, and there remains 6. Then 7 times 3 is 21, and 3 that I borrowed is 24, from 3 I cannot, but 24 from 33, and there remains 9. Then 7 times 2 is 14, and 3 that I borrowed is 17, from 17, and there remains 0. Then I bring down the next Figure 9, and the Work appears thus:

```
2345)345678901(147
     ---------
     11117
     -----
      17378
      -----
        9639
```

Then I bring down the reſt of the Figures, one after another, working as before, till the whole is finiſhed in the following Manner.

```
2345)345678901(147411
          .....
     -----
     11117
     -----
      17378
      -----
        9639
        -----
         2590
         ----
          2451
          ----
Remainder (106)
```

Thus have I explained both the *Italian* Ways of Diviſion, leaving it to the Learner to uſe which he likes beſt. But my Method will be to purſue the firſt *Italian* Way thro' the remaining Part of this Book, it being very plain and eaſy to be underſtood.

There is a very ſhort Way of Diviſion [I think the ſhorteſt that can be] by Cancelling; and ſo I ſhall give one *Example* to ſhew its Brevity: My Deſign, in this Book, being not only to ſhew the moſt intelligible, but the neareſt Way to the Buſh in all the Rules.

Example.

~~11~~(1
~~472~~(4
~~142584~~(3
Divide 6945407 by 276)~~6945407~~(25164

Firſt I ſeek, and find I can take two times, and ſay, twice 6 is 12, from 4 I cannot, but 12 from 14 (the 4 being over the Point or Stop for the firſt Dividual) and there remains 2; then twice 7 is 14 and 1 is 15, from 19, 4; and twice 2 is 4 and 1 is 5, from 6, 1: And then there is 1425 for a new Dividual, *&c.* See the Work; the Quotient being 25164, and the Remainder 143.

VIII. When there is a Cypher, or Cyphers in the Diviſor, towards the right Hand, you may cut it, or them off, with a downright Stroke of the Pen, and alſo do the ſame with as many Figures, or Cyphers to the Right of the Dividend; and then divide the remaining Figures of the Dividend by the remaining Figures of the Diviſor, as if there had been no Cyphers in the Diviſor, or Dividend; and what you cut off from the Dividend, is the Remainder or Part of it: For what remains after the Work is done, muſt be put to what you cut off from the Dividend, for the whole Remainder.

Examples.

```
                                  By the ſhort Italian Way.
24|00)7694|06(320           345|000)8092320|000(23456
      72                            1192
     ----                          ------
      49                            1573
      48                           ------
     ----                            1932
Rem. (1406)                         ------
                                      2070
                                     ------
                                Rem.  (0)
```

For the firſt of theſe *Examples*, there are two Cyphers in the Diviſor, wherefore I cut off two Places from the Dividend, and divide 7694 by 24, and there remains 14 at the laſt; to which I bring down the two Places cut off, *viz.* 06, and annex them to the 14, for the whole *Remainder*, *viz.* 1406, and the Quotient is 320.

In the ſecond *Example*, there are 3 Cyphers in the Diviſor, which I cut off; and alſo as many in the Dividend, and divide by 345; and then the Work is done, and there remains nothing.

IX. Any Diviſion Sum, when the Diviſor is ſuch a Number that any two Digits or Numbers in the Multiplication Table, being multiplied together, do make it, *viz.* the Diviſor, then ſuch Sum may be done at two Diviſions, or by Component Parts, much ſooner, and in fewer Figures than at one.

Examples.

Divide 16560 by 48

At one Diviſion.	*At two* Diviſions, *or Component (Parts.*
48)16560(345	6)16560
144	8) 2760
216	345 *Quotient.*
192	
240	
240	
(0)	

Here the two Numbers in the Table, multiplied together, that make the Diviſor, are 6 and 8, for 6 times 8 is 48, the Diviſor; wherefore I divide the Dividend 16560 by 6, and the Quotient is 2760, which I divide by 8 the ſecond Number, and the Quotient, by that, is the true Quotient ſought, *viz.* 345, as in the common way.

Bring 1212288 Ounces of *Raw Silk*, into Pounds of 24 Ounces.

At one Diviſion.

24)1212288(50512
.....

120

122
120

28
24

48
48

(0)

At two Diviſions, *or Component* (*Parts.*

12)1212288

2) 101024

50512 *Quot. ſought*

Here are eleven Figures Difference between one Way and the other.

More Examples.

At one Diviſion.
72)488808(6789
432
568
504
640
576
648
648
(0)

By two Diviſions, *or Component Parts.*
8)488808
9) 61101
6789 *Quotient.*

Here, if I had taken 6 and 12 for my Diviſors, they would have produced the ſame Quotient, for 6 times 12 is 72, as well as 8 times 9.

(56 *the Diviſor*
7)18648
8) 2664
333 *Quotient ſought*

(99 *the Diviſor*
9)537768
11) 59752
5432

If there happen to be any Remainder, either in the firſt or ſecond Diviſion, or in both, yet the Quotient will be the ſame. But when there are Remainders, the Way to find the true Remainder, as if you divided at once, is to multiply the firſt Diviſor by the laſt Remainder, taking in the firſt Remainder, if any be.

Of MONEY.

X. Now I will ſhew how to divide Pounds, Shillings and Pence, without reducing them any otherwiſe than in your Mind; and alſo how this Rule anſwers many Queſtions that ſeem to require a Recourſe to the *Rule of Three* for their Solution.

Divide *l.* 12 10 *s.* 6 *d.* among 5 Perſons.

Diviſor 5)12 10 6 *Dividend.*

Each muſt have 2 10 1 $\frac{1}{5}$ *Quotient* or *Anſwer.*

Here I ſay the Fives in 12 twice, and there remains 2; which are two Pounds, (for the Remainder is always the ſame with the Dividend) or 40 Shillings, and 10 *s.* in the Shillings Place, is 50 *s.* the Fives in 50, 10 times, which I put in its Place, *viz.* under the Place of Shillings, Then the Fives in 6, once, and there remains one; which is one Fifth of a Penny. So each Man muſt have 2 *l.* 10 *s.* 1 *d.* $\frac{1}{5}$ for his Share.

The foregoing Work is much ſooner done, and looks a great deal handſomer than that in the Margin; for there you are obliged to reduce the 12 *l.* 10 *s.* 6 *d.* into Pence, and then you divide by 5, and the Quotient gives the Pence each Perſon muſt have; and then them Pence are brought into Pounds, &c. The Sum above is proved by the brief Rules in Multiplication of Money, ſufficiently ſhewn in that Rule, in the following Manner.

The Common Way.

l. *s.* *d.*

12 10 6

20

250

12

5)3006

12) 601 ($\frac{1}{5}$

2'0) 5/0 (1

l. 2 10 1 $\frac{1}{5}$

l. 2 10 1 $\frac{1}{5}$ Each
5 Perſons

l. 12 10 6 Proof

In this Excellent Method of *Diviſion* of ſeveral Denominations (for *Weight* or *Meaſure* may be ſo divided as well as *Money)* whatever remains, you always bring it (in your Mind only) into the Quality of the next Denomination towards the Right-Hand; and if there be any thing there, you take it in, and then ſeek, *&c.* as in the foregoing Sum, where I ſaid the Fives in 12, twice, and there remained 2, which I turned into Shillings, (the Name of the next Denomination) which with the 10 Shillings in the Place of Shillings, make 50; then I ſay, the Fives in Fifty, *&c.*

8)
Again, Divide l. 67 09 4 among 8 Perſons.

Quotient l. 08 08 8 *Anſwer.*

Here I ſay, the Eights in 67, 8 times, and there remains 3 *l.* or 60 Shillings, and 9 Shillings in the Place of Shillings, is 69, the Eights in 69, 8 times, and there remains 5 Shillings, or 60 Pence, and the 4 Pence in the Place of Pence, make 64; the Eights in 64, 8 times, and nothing remaining. So each muſt have *l.* 8 08 8 as by the Work above.

If 5 Gallons of Brandy coſt *l.* 1 16 8 what is that the Gallon?

A General Rule.

Divide the Money by the Quantity: and here I ſay, the Fives in 36, *&c.*

5) 1 *&c.*

	l.	*s.*	*d.*
5)	1	16	8
Anſw.	0	07	4
			5
Proof,	1	16	8

If 9 Stone of Beef coſt
what is that a Stone?

	s.	*d.*
9)	16	6
	1	10 *Anſw.*

If 9 Gallons of Arrack coſt
what is that a Gallon?

9) *l.*	4	08	01 ½
Anſw.	0	09	09 ½

If 11 C. of Hops coſt
What is that *per C.*?

11) *l.*	53	01	06
Anſw.	4	16	06

If the Charge of a Country Feaſt amounts to 314 *l.* 16 *s.* 8 *d.* and it is to be paid by 12 Stewards, what muſt each Steward pay?

12) *l.*	314	16	8
Each muſt pay *l.*	26	04	8 ½ $\frac{8}{12}$
			12
	314	16	8 *Proof.*

XI. As in Diviſion of one Denomination, according to the 9th Rule of this Chapter, where two Numbers in the *Multiplication Table* make the Diviſor, being multiplied together, the Work might be performed at two Diviſions; ſo in Diviſion of ſeveral Denominations, the Work may be done after the ſame Method, following the Directions given in the ſaid 9th Rule.

Example.

A Reckoning of *l.* 6 00 0 among 32 Men, what muſt each Man pay?

4) *l.* 6 00 0

8) 1 10 0

Each pays 0 03 9

Here the two Numbers are 4 and 8, therefore I firſt divide by 4, and then that Quotient by 8; or firſt by 8, and then by 4, it will be all one.

If 56 lb. of Coffee coſt what is that a Pound?

7) *l.* 21 11 8

8) 03 01 8

Here 7 times 8 make 56 the Quantity.

Anſw. 00 07 8 $\frac{1}{2}$

10) Divide *l.* 32 12 6 between 100 Perſons.

10) 3 05 3

0 06 6 $\frac{3}{10}$ each

If 72 Gallons of Wine coſt what a Gallon?

8)
l. 19 4 1
9) 2 8 0
Anſwer 0 5 4

If 81 lb. of Nutmegs coſt what a Pound?

9)
l. 49 17 3 $\frac{3}{4}$
9) 5 10 9 $\frac{3}{4}$
Anſw. 0 12 3 $\frac{3}{4}$

If 45 *C.* of Hops coſt what 1 *C.* Weight?

l. 5) 120 07 6
9) 24 01 6
Anſw. l. 2 13 6

A general Rule for Weight.

Having the Price of a *C.* Weight, to know the Price of a Pound. Divide by 7 and 8, (7 times 8 being 56, the Half Hundred Weight) and take the Half of the laſt Quotient, which will be the Anſwer.

Examples.

If 112 lb. of Caſt Iron coſt what a Pound?

7) *s.* *d.*
2 4
8) 4
2

The Half of a Half-penny is $\frac{1}{4}$ *Price of a* lb.

If 112 ℔. of Lead coſt what a Pound?

7)
7 *s.*
8) 1
1 ½
The Half is ¾

If 112 ℔. of Sugar coſt what a Pound?

7)
l. 1 17 4
8) 05 4
8
The Half of 8 is 4 *d. Anſwer.*

If 112 ℔. of *Currants* coſt what a Pound?

7)
l. 3 10
8) 10
1 3
The Half of 15 *d.* is 7 ½

So at any time, in any Diviſion Sum, if the Diviſor be 112, the Quotient is ſoon found by this Way of Diviſion by Parts.

I will leave one *Example* alſo by the common Way to ſhew the Tediouſneſs of the one, and the Expedition of the other.

The

The Common Way.

Divide *l.* 1476 19 8 ¾ between 27 Perſons.
20
29539
12
354476
4
27)1417907 *Farthings.* 4)52515 *Farthings each*
135 12)13128 ¾
67 2|0)109|4
54 *Anſwer, l.* 54 14 0 ¾
139
135
40
27
137
135
(2)

The other Way.

l. 3)1476 19 8 ¾
9) 492 06 6 ¾ ⅓
Anſwer, l. 54 14 0 ¾

Here is a prodigious Difference between one Way and the other, one having almoſt 60 Figures more in the Work than the other.

Note, That Weight and Meaſure may be divided by Parts as Money.

Example.

If 42 Bags of *Spaniſh* Wool weigh what 1 Bag?

	C.	*qrs.*	lb.
6)	110	1	00
7)	18	1	14
Anſw.	2	2	14

If 45 Pieces of Linen contain what one Piece?

	Yds.	*qrs.*	*Nls.*
9)	2157	0	3
5)	239	2	3
Anſw.	47	3	3

CHAP. VI.

REDUCTION,

IS wholly performed by *Multiplication* and *Diviſion*; and teaches to bring or change Numbers of one Denomination, into Numbers of another, without the leaſt Alteration of Value, tho' in different Terms. For Inſtance:

Suppoſe I am to bring 20*l.* into Farthings, which when I have done, the Work will produce 19200 Farthings,

things, which are equal in Value to *l.* 20: For when they are reduced rightly back again, the laſt Quotient will preciſely produce *l.* 20, neither more or leſs.

II. All great Names are brought into ſmaller, of equal Value, by *Multiplication*; that is, by multiplying the given Number by as many of the next leſſer Name, as make one of that greater: As *Pounds* into *Shillings*, *Pence* or *Farthings*: Or, *Tuns Weight* into *Pounds Weight*, &c.

III. All ſmall Names are brought into greater of equal Value, by *Diviſion*: That is, by dividing the given Number by as many of the leſſer as make one of the next greater Name: As *Farthings* into *Pence*, *Shillings* or *Pounds*: Or, *Pounds Weight* into *Quarters*, *Hundreds*, or *Tuns Weight*.

Example 1.

In 20 *l.* how many Farthings?
20 Shillings make a Pound.

400 Shillings in 20 *l.*
12 Pence make 1 *s.*

4800 Pence in 20 *l.*
4 Farthings, one Penny.

19200 Farthings in 20 *l.*

20 *s.*
12

Pence, 240 in a Pound
4

Farth. 960 in a Pound

Or thus:
20 *l.*
960 Farthings in a Pound.

Farths. 19200 Anſwer.

In the Queſtion above, it is required to bring *Pounds* into *Farthings*, which is a great Name to be brought into a ſmaller; which according to the IId Rule of this Chapter, is to be done by *Multiplication*. Wherefore, as is there directed, I multiply the given Number 20 *l.* by 20, the Shillings in a Pound, and the Product is the Shillings in 20 *l.* Then them Shillings by 12, the Pence in a Shilling, and the Product is the Pence in 20 *l.* and them Pence by 4, the Farthings in a Penny, and that Product is the Farthings in 20 *l.* and the Anſwer to the Queſtion, as may be ſeen by the preceding Work.

Or, as before, I multiply the 20 *l.* by 960, the Farthings in a Pound, but I multiply 960 by 20, tho' the 20 be uppermoſt to ſave Room: for at any Time the *Multiplier* may be multiplied by the *Multiplicand*; for the Product will be the ſame either Way.

By the foregoing Methods are all *Reductions* deſcending, (that is, from greater Denominations to leſſer) work'd, whether they be *Money*, *Weight*, or *Meaſure*. That is, by conſidering how many of the next leſſer, make a Unit, or one of the foregoing greater Denominations, as before directed; and then multiply accordingly, deſcending from one Denomination to the next, till the Work is finiſhed. And for further Aſſiſtance, reſpect muſt be had to the former Tables of Quantity in *Money*, *Weight* and *Meaſure*, in the IId Chapter of this Book.

Pounds multiplied by 20 produce Shillings; Shillings multiplied by 12 give Pence, Pence multiplied by 4 produce Farthings.

Farthings divided by 4 are Pence, Pence divided by 12 quote Shillings, Shillings divided by 20 are Pounds.

Example 2.

In 19200 Farthings, how many Pounds?

4)19200

12)4800

2|0)40|0

l. 20 *Anſwer.*

Or thus:

96|0)1920|0(20

192

(0)

Here it is required to bring Farthings into Pounds; which is a ſmall Name into a greater; and therefore according to the IIId Rule of this Chapter, it is done by Diviſion; wherefore I divide the given Number, 19200 by 4, the Farthings in a Penny, and the Quotient is Pence, and them Pence I divide by 12, the Pence in a Shilling, and the Quotient is Shillings; and them Shillings I divide by 20, the Shillings in a Pound, and the Quotient is Pounds; to wit; 20 *l.* and is a ſure Proof of the foregoing *Example*.

Or I divide the 19200 Farthings by 960, the Farthings in a Pound, and the Quotient is the ſame, *viz.* 20 *l.*

Example 3.

In 567 *l.* how many Shillings, Pence, and Farthings?
By 20

11520 Shillings.
By 12

138240 Pence.
By 4

552960 Farthings.

(*This is a great Name to be brought into a ſmaller, and therefore I multiply*)

Example 4.

In 552960 Farthings, how many Pence, Shillings, and Pounds?

Divide by { 4)552960
12)138240
2|0)1152|0

l. 576 Anſwer and Proof.

This is the Reverſe of the 3d *Example*, and a ſmall Name to be brought into a great, and therefore I divide and find *l.* 576 the Anſwer and Proof to the ſaid *Example*; for *Reduction* aſcending proves *Reduction* deſcending; and ſo the contrary.

☞ Note, *When you are to bring Shillings into Pounds, (let the Number be what it will) cut off the laſt Figure, or Cypher, towards the Right Hand, and halve the other towards the Left, (which is dividing by* 20, *but ſhorter) and that Half ſhall be Pounds, and the Figure cut off is Shillings: And if any thing remain after the halving of the laſt Figure, which is never more than one, it muſt be joined to the Figure, or Cypher cut off; as in the 4th* Example *foregoing, and in the ſubſequent following*, viz.

Bring 423|7 Shillings into Pounds.

l. 211-17

Here the $\frac{1}{2}$ of 4 is 2, the $\frac{1}{2}$ of 2 is 1, and the $\frac{1}{2}$ of 3 is 1, and there remains 1, which is 1 Ten, which muſt be put to the 7 cut off, and it makes 17 *s.* So the whole is *l.* 211 17 *s.* as above. By the ſame Method may *Tuns* be reduced into *Hundreds Weight.*

A General Rule.

When you have Pounds to be reduced into Farthings, multiply by 20, by 12, and by 4; or by 960, the Farthings in a Pound.

When you have Farthings to be reduced into Pounds, divide by 4, by 12, and by 20, or by 960.

If Pounds are to be brought into Pence, multiply by 240, the Pence in a Pound: if the contrary, divide by 240.

Exampl

Example 5.

Reduce 476 *l.* into Pence,
240

19040
952

Pence 114240

Here I multiply by 12, and by 2, twice 12 being 24; and for the Cypher I add it at the laſt.

Or thus:
476
12

5712
2

114240 Pence.

According to the 8th Rule of Chap. 4.

Reduce 114240 Pence into Pounds, by dividing by 240

24|0)11424|0(476 *l.* Anſwer.
96

182
168

144
144

(0)

Or thus:
12)11424|0

2)952

l. 476 Anſwer.

Here, in the ſecond Way, after I have cut off a Place from the *Dividend*, for the *Diviſor*'s Cypher, I divide by 12, and by 2, which multiplied together, make 24, and for the Cypher to make it 240, there's a Place cut off from the *Dividend*; ſo that I divide only by 12, and by 2, according to the IXth Rule of the foregoing Chapter. See the Work above.

By the ſecond Way there are many Figures, and much Trouble ſaved; as may be ſeen by comparing one Way with the other.

Example

Example 6.

Bring 476 Pounds into Farthings, by multiplying by

960
476

5760
6720
3840

Farthings 456960

Or thus:
l. 476
8

3808
12

Farthings 456960

In the ſecond Way I multiply by 8, and by 12, according to the VIIth Rule of the IVth Chapter, 8 times 12 making 96, and I add the Cypher at laſt.

Example 7.

Bring 456960 Farthings into Pounds by dividing by
96,0)45696|0(476 *l.* Anſwer.

384

729
672

576
576

---

(0)

Or thus:
8)45696|0

---

12)5712

---

l. 476 Anſ.

IV. When the Sum to be reduced conſiſts of ſeveral Denominations; as Pounds, Shillings, and Pence, or Tuns, Hundreds, Quarters, and Pounds, then you muſt multiply as before; but you muſt take in the Shillings, Pence, or Farthings, that ſtand in each Denomination, as you reduce the higher Name to the next inferior.

Example

Example 8.

In *l.* 426 19 8 $\frac{1}{2}$ how many Farthings?
20

8539 Shillings.
12

102476 Pence.
4

409906 Farthings. Anſwer.

Here I multiply firſt by 20, ſaying, 0 is nothing, but 9 that ſtands in the Unit's Place of Shillings, is 9; then twice 6 is 12, and 1 that ſtands in the Tens Place of Shillings is 13, 3 and carry 1, &c. Then, when I come to reduce the Shillings into Pence, I ſay 12 times 9 is 108, and 8 that ſtands in the Place of Pence is 116, 6, and carry 11, &c. Then when I reduce the Pence into Farthings, I ſay, 4 times 6 is 24, and 2 that ſtand in the Place of Farthings is 26, 6 and carry 2, &c. *See the Work.*

Example 9.

4)
In 409906 Farthings, how many Pence, Shillings, (and Pounds?
d.
12)102476 $\frac{1}{2}$
s.
2|0)853|9-8 *d.*

l. 426-19-8 $\frac{1}{2}$ Anſwer and Proof.

I firſt divide by 4, and there remains ½ that was taken in; then by 12, and there remains the 8 *d.* taken in; and then by 20, (or cut off the laſt Figure, and halve the other, as before directed, to bring Shillings into Pounds) and there remains the 19 Shillings taken in.

Example 10.

4)
In 2403590 Farthings, how many Pounds, &c.

12)600897 ½ Here I divide by 4, by 12, and by 20, according to the foregoing general Rule.

2|0)5007|4-9 *d.*

l. 2503-14-9 ½

Example 11.

In *l.* 2503 14 9 ½ how many Farthings?
20

50074 Here I multiply by 20, by 12, and by 4, according to the before mentioned general Rule.
12

600897
4

2403590 Farthings

Theſe two Sums are a Proof to each other.

Example

Example 12.

In *l.* 742 14 6 how many Pence?
20

14854
12

178254 Anſw.

Here I multiply by 20, and take in the 14 *s.* and then by 12, and take in the 6 *d.* according to the IVth Rule of this Chapter.

Example. 13.

12)
In 178254 Pence, how many Pounds, &c.

2|0) 1485|4-6

---

l. 742 14 6 Anſwer.

In *l.* 759 17 8 ½ how many Halfpence?
Anſwer 364745

Multiply by 20, 12, and 2.

Bring 364745 Halfpence into Pounds, &c.

Divide by 2, 12, and 20.

Or Halfpence may be brought into Pounds by dividing componently, by 480, and Pounds into Halfpence by multiplying by 480.

In *l.* 529 12 6 ⅛ how many Eights of a Penny?
Anſwer 1016885.

Multiply by 20, 12, and 8, taking in, &c.

Bring 1016885 Eights of a Penny into Pounds, &c.

Divide by 8, 12, and 20.

Any Number of Pence may be brought into Pounds, Shillings, and Pence, at one working, thus: Add a Cypher to the given Number, and divide them by 240, as uſual, doubling the laſt Figure of the Quotient for Shillings, and the Remainder is Pence: As for *Example*: Bring the foregoing 13th *Example*, *viz.* 178254 Pence into Pounds, Shillings, and Pence, at one Work.

```
24|0) 178254|0 (742-7
      . . .       2
      168        ----
     ------fac.742-14-6
      102      ---------
       96
      ----
       65
       48
      ----
      174
      168
      ----
Rem.  (6)
```

Here the laſt Figure, 7 doubled, is 14 *s.* and the 6 *d.* remains.

Or thus:

```
 2)178254
 ---------
12)89127-6
 ---------
   742-7
       2
 ---------
l. 742-14-6
```

Or thus:

```
12)178254
 ---------
 2)14854|4-6
 ---------
l. 742-14-6
```

Here I omit the Cypher, becauſe I neglect it in the Diviſor.

So likewiſe may Farthings be brought into Pounds, Shillings, Pence, or Farthings at one Work, by adding a Cypher, and dividing by 960, doubling the laſt Figure of the Quotient for Shillings, as above.

Example.

In 39291 Farthings, how many *l. s. d.* and *qrs?*
Anſwer, l. 40 18 6 $\frac{3}{4}$

96|0)39291|0(40 9
2
384
l. 40 18 6 $\frac{3}{4}$ Anſwer.
891
864
(27) *qrs.* is 6*d.* $\frac{3}{4}$

Or you may omit adding the Cypher to the given Number, ſince you cut off the Cypher from your Diviſor; but you muſt not forget to double the laſt Figure. Or it may be done at two Diviſions, thus:

8)39291
12)4911 $\frac{3}{8}$
40-9 $\frac{3}{12}$
2
Facit, l. 40 18 6 $\frac{3}{4}$

The firſt Remainder is $\frac{3}{4}$, and the laſt three Two-Pences.

Or by multiplying the firſt Diviſor 8, by the laſt Remainder 3, taking in the firſt Remainder 3, (as the Rule in *Diviſion* by Component Parts directs) makes 27 Farthings, equal to 6 *d.* $\frac{3}{4}$

Of COINS.

Here the ſeveral Species of *Coin* muſt be reduced into one Name, whether Shillings, Pence, or Farthings; and then divide the greater Number by the leſſer, and the Quotient will be the Anſwer.

Example.

```
In l. 262  04  6 Sterling, how many Dollars, at
       20                  4 s.  3 d. Sterling,
    -----                        12
     5244                        --
       12               Diviſor 51
   ------            Doll.
 51)62934 Pence.  (1234 Anſwer.
```

As above directed, I reduce the Dollars into Pence, and tney make 51; and then alſo the *l.* 262 04 6 into the ſame Number, *viz.* Pence; and they are 62934, which I divide by 51, the Pence in a Dollar; and the Quotient is the Anſwer, *viz.* 1234 Dollars.

Example.

```
In 1234 Dollars, at 4 s.  3 d.  how many l. Sterl.
     51             12
   ----             --
   1234  Multip.    51 Pence.
  6170              --
  -----
 12)62934 Pence.
   ------
 2|0)524|4 6
   ------
 Anſ. l.262 04 6
```

Here I multiply the Number of Dollars by the Pence in one; and the Product is the Pence that are in them all; which I divide by 12, and by 20, which brings them Pence into Pounds

Example

Example 3.

```
         In l. 562-18 how many French Crowns at
                20          (54 d. 1/8 per Crown.
            ---------             8
              11258          -----
                 12            433
            ---------
             135096
                  8
            --------- Crowns
      433)1080768(2496 Anſwer.
          866...
          -----
          2147
          1732
          -----
           4156
           3897
           -----
            2598
            2598
            -----
             (0)
```

Here I firſt bring the Crowns into Eighths, by multiplying by 8, and taking in the 1 over the 8; and then I do the ſame, by *l.* 562-18, that the *Dividend* and *Diviſor* may be of the like Name; and then I divide the one by the other, and the Quotient gives the Anſwer, *viz.* 2496 Crowns.

Example 4.

In 2496 *French* Crowns, at 54 *d.* $\frac{1}{8}$ *per* Crown, how
433 many *l. Sterl.* 8

7488 433
7488
9984

8)1080768 Eights.

12)135096
2|0)1125|8

l. 562-18 Anſwer and Proof to the above Queſt.

Example 5.

In 426 Piſtoles at 17 *s.* each, how many Guineas at
204 12 21 *s.* 6 *d.*
12

1704 Pence 204 Multiplier
8520 Diviſor 258 *d.*
Guin.
258)86904($336\frac{216}{258}$ Anſw.
774

950
774

1764
1548

(216)

Here the Pence in 426 Piſtoles, are divided by the Pence in a Guinea, and the Quotient is the Anſwer, *viz.* 336 Guineas, and 216 Pence over, which is 18 Shillings.

Example

Example 6.

```
                      In 336 Guineas, and 216 Pence, how
Pence in a Guinea    258 (many Piſtoles at 17 s. each?
                    ----                  12
                    2688                 ---
                   1680          Diviſor 204
                   672
                     216 Pence that remained.
                   ------ Piſtoles
                204)86904(426 Anſwer and Proof to the
                    816··         (foregoing Queſtion.
                    ----
                     530
                     408
                    ----
                    1224
                    1224
                    ----
                     (0)
```

Piſtoles of 17 *s.* are brought into Guineas of 21 *s.* by multiplying by 17, and dividing by 21.

Example 7.

In 436 Piſtoles, how many Guineas?

Anſwer $352\frac{20}{21}$. That is, 353 Guineas, wanting 1 *s.*

Guineas into Piſtoles, by the contrary Practice.

Example 8.

In 1546 Pieces of Eight, at 4 *s.* 6 *d.* how many (*l. Sterling.*
54 Pence in one Piece of $\frac{8}{8}$ — 12
——
6184 — 54
7730
——
12)83484 Pence in them all.
2|0)695|7
——
l. 347-17 Anſw.
——

Or this Queſtion may be done by *Multiplication of Money*, according to the Method taught in that Rule, thus:

s. *d.*
1546 Pieces of $\frac{8}{8}$ at 4 6
10
——
l. 02 05 0 The Value of 10
10
——
22 10 00 of 100
10
——
1000—225 00 0
500—112 10 0
40—009 00 0
6—001 07 0
——
Anſw. 1546 *l.* 347 17 0

Example 9.

Example 9.

In *l.* 497-06-8 how many Marks at 13 *s.* 4 *d.* ?

20

9946

12

Marks.

16|0)11936|0(746 Anſw.

112

73

64

96

96

(0)

12

Diviſor 160

Or thus;

4)11936

4) 2984

Anſw. 746 Marks.

Here 4 times 4 is 16, omitting the Cypher in the Diviſor, and therefore cut one off from the Dividend.

Example 10.

In 746 Marks at 13 *s.* 4 *d.* how many *Pounds?*

160

44760

746

119360 Pence.

12

160

12)119360

2|0) 994|6-8 *d.*

l. 497-6-8 Anſ.

Or Marks, or any thing elſe at 13 *s.* 4 *d.* are brought into *Pounds*, &c. by multiplying by 2, and dividing by 3, and what remains will be one or 2 Nobles.

Pounds Shillings and Pence are brought into Marks by adding ½, as by *Example* the 9th.

In *l.* 497 06 8 how many Marks ?

248 13 4

Marks 746 Anſw.

Again, Marks are brought into Pounds by deducting $\frac{1}{3}$, *Example* the 9th.

In 746 Marks, how many Pounds?
248 13 4 The $\frac{1}{3}$ to be deducted.

l. 497 06 8 Anſwer, and Proof to the Example above.

The 10th Example foregoing may be done by *Multiplication*, thus:

746 Marks at		13	4		
			10		
Or thus:					
746	*l.* 6	13	4	Value of	
4			10	10 Marks.	
2984	66	13	4	Ditto	100
4			7	Marks.	
12)119360	466	13	4	Ditto	700
	26	13	4	Ditto	40
2|0)994|5-8	4	00	0	Ditto	6
l. 497 06 8 *Anſ.*	*l.* 497	06	8		746

In the Example on the Left Hand, after I have multiplied by 4 and by 4, I annex a Cypher, to make the laſt Product Pence; in regard that there's a 0 in 160, the Pence in a Mark.

Example 11.

In *l.* 389 10 how many Florins at 3 *s.* 2 *d.*
20 12
7790 38 *d.*
12
Florins.
38)93480(2460 Anſwer.
76...
174
152
228
228
(0)

Example 12.

In 2460 Florins, at 3 *s.* 2 *d.* how many *l. Sterling?*
38 12
19680 38 Pence.
7380
12)93480 Pence.
2,0)779,0
l. 389 10 Anſwer and Proof.

☞ *At any time when you can diſcover how many of one ſort of Pieces, or Coin, are equal to any Number of the other, the Example is ſpeedily done by multiplying by the leſſer, and dividing by the greater Number.* Example, *In* 542 4d. $\frac{1}{2}$ *how many* 13d. $\frac{1}{2}$*? Multiply by* 3 *and divide by* 9. Anſw. 180 $\frac{6}{9}$ pcs. 13 d. $\frac{1}{2}$.

Example 13.

In 2712 Guilders at 2 *s.* each, how many Rix-Dollars at 4 *s.* 5 *d.* ½?

96 — 12

16272 Half-Pence 48 in 2 *s.*

24408 — 2 — 53

4

214)260352(1216 Rix-D.) *qrs.* 96 in a *Gil.*

214 — 214 *qrs.* in a Dollar.

463

428

355

214

1412

1284

(128)

Here the Anſwer is, 1216 Rix-Dollars, and 128 Farthings *Remainder*, or 2 *s.* 8 *d.*

Pounds are brought into Guineas by multiplying by 20, and dividing by 21; thus:

In 730 *l.* how many Guineas?

20

7)14600

s.

3) 2085 5

Anſwer 695 Guineas and 5 *s.* over.

In 695 Guineas, and 5 *s.* how many Pounds?

Guin. *s.*
695 5
7 and 3 multiply by

4865 }
3 } The 5 Shillings taken in.
2'0)1460|0 }

l. 730 Proof.

Example 14.

In 798 *l.* how many Nobles, Marks, Crowns, Shillings, Pence, and Farthings?

	798
Nobles in 20 *s.*	3
Nobles	2394
Marks	1197
	798
Crowns in a Pound	4
Crowns	3192
Shillings in a Crown	5
Shillings	15960
Pence in a Shilling	12
Pence	191520
Farthings in a Penny	4
Farthings	766080

I bring the Nobles into Marks, by dividing them by 2, becauſe 2 Nobles make a Mark.

Examples at large.

In *l.* 74622 17 6 how many Half-Crowns?

Multiply by 8, and take in 7. Anſw. 596983.

In *l.* 22740 13 4 how many Nobles?

Multiply by 3, and take in 2. Anſw. 68222.

In 76543 *Bitts* of *Jamaica*, each 7 *d.* $\frac{1}{2}$ *Sterling*, how many Pounds *Sterling*? Anſw. *l.* 2391 19 4$\frac{1}{2}$.

In *l* 1725 19 4 *Sterling*, how many *Spaniſh* Dollars at 4*s.* 4*d.* Anſw. 7966.

In 279623 Millreas of *Portugal*, at 5 *s.* 3 *d.* $\frac{1}{4}$, how many Pounds *Sterling*? Anſw. *l.* 73692 06 2$\frac{3}{4}$.

In 1276 Moidores, at 26 *s.* 6 *d.* how many Guineas, at 21 *s.* Anſw. 1610$\frac{48}{252}$.

In 150000 Cruſadoes, each 400 Reis, 1000 Reis to a Millrea, at 5*s.* 6*d.* *Sterl.* how many Pounds *Sterling*? Anſw. 16500.

In *l.* 3400 how many Crowns, Half-Crowns, Shillings, Groats, and Three Pences, and of each the ſame Number?

Anſwer 7486 Pieces of each Sort, and 26 *d.* over.

Avoirdupois-

Avoirdupois-Weight.

In reducing this Weight, *Troy-Weight*, or of *Meaſure*, *Time*, *&c.* you muſt be acquainted with the *Tables of Quantity*, *&c.* in the 2d Chapter of this Book.

Example 1.

Tuns. C. qrs. lb.
In 24 14 3 15 how many Pounds Weight?
20 *C.* Tun

494 Hundreds Wt.
4 *Qrs.* 1 *C.*

1979
28 lb. 1 *qr.*

15837
3959

Anſ. 55427 Pounds.

Here are great Names to be brought into ſmaller, and therefore to be done by *Multiplication*; wherefore I multiply, according to the Table in the aforementioned Chapter, *viz.* by 20, by 4, and by 28; taking in the odd Weight in each Denomination, as in *Reduction of Money*; and the laſt Product is the Anſwer, *viz.* 55427.

Example 2.

```
      28)
In 55427 Pounds, how many Tuns, &c.
     ...
    28              4)1979
   ----            --------
    274           2|0)49|4-3
    252         ------------------
    ---         Tuns. 24   14   3   15 Anſw.
     222        ------------------
     196
     ---
      267
      252
      ---
      (15)
```

Here I proceed reverſely, dividing by 28, by 4, and by 20. Or this *Diviſion* Sum may be done by 4 and 7, the component Parts of 28.

Example 3.

C. qrs. ℔. *oz. dr.*
In 24 3 24 12 14 how many Drams?
4 Qrs. 1 C.

99 Quarters
28 ℔. 1 Quarter.

796
200

2796 Pounds.
16 *Oz.* 1 ℔.

16778
2797

44748 Ounces
16 Drams 1 *Oz.*

268492
44749

In 16)715982 Drams, how many Hundreds, &c.
64····

75
64

119
112

78
64

142
128

16)44748
32···

127
112

154
144

108
96

(12)

4)
(28)2796(99 *qrs.*
252·—24 3

276
252

(24)

4)99 *Qrs.*

(14) C. 24 3 24 12 14 Anſw. and Proof.

Example

Example 4.

In *C.* 24 3 26 how many Pounds?

4

99

28

798

200

Anſ. 2798 Pounds.

Or thus:

112 lb. a *C.* Weight.

24 the Number of *C.*

448

224

110 the odd Weight.

l. 2798 Anſw.

Example 5.

C. *qrs.* lb.

In 425 3 22 how many Pounds?

Mult. by 112

5100

425

106 Odd Wt.

47706 Anſwer.

Here I ſay, 12 times 5 is 60, &c. and take in the odd Weight.

A Quicker Way.

Hundreds, Quarters, and Pounds, may be ſpeedily reduced into Pounds, thus: Set down the Groſs Hundreds, four ſeveral Times, in the Form following, and take in the Odd Weight, as above.

C. *qrs.* lb.

In 24 3 26

24

24

24

110 Odd Weight.

Anſw. 2798 Pounds as above.

Here is nothing to do but to ſet the Hundreds down, as before, with the odd Weight, and add them together, and therefore it is the ſhorteſt Way of all others to reduce Hundreds Groſs into Pounds.

More Examples.

In *C.* 27 3 19 how many Pounds?
27
27
27
103 Odd Weight.
Anſwer 3127 Pounds.

112 lb. 1 *C.* Weight.
27
784
224
103 Odd Weight.
3127 Pounds.

In one Hogſhead, *qt.* *C.* 7½ 12 how many Pounds?
7
7
7,68 Odd Weight.
Anſw. 852 Pounds.

In 256 1 17 how many Pounds?
256
256
256,45 Odd Wt.
Anſw. 28717

In *C.* 4 3 27 how many Pounds?

4	112 lb. 1 *C.* Wt.
4	4
4	448
111 Odd Wt.	111 Odd Weight.
559 Anſwer.	559 Proof.

Examples at large.

In *C.* 9 ½ 14 lb. of Indigo, how many Pounds?
112

1078 Anſwer.

In *C.* 246 ¾ of Cotton Yarn, how many Pounds?
Anſwer 27636.

Tuns. *C.* *qrs.* lb.
In 276 12 3 24 of Cheeſe, how many Pounds?
Anſwer 619692.

In 574859 Pounds of Copper, how many Tuns, &c.
Tuns. *C.* *qrs.* lb.
Divide by 112, &c. Anſw. 256 12 2 19

In 426 *C.* of Tobacco, how many Boxes, each to weigh 12 lb. Anſwer 3976.

In *C.* 417 3 12 of Pimento, how many Caſks; each *C.* 3¼ 26 lb. Anſwer 120.

Suppoſe 6 Oxen weigh *C.* 38 2 8 how many Stone?
Anſwer 308 *St.* 8 ℔.

Silk of 24 Ounces to the Pound, is reduced to Pounds of 16 Ounces by adding $\frac{1}{2}$, becauſe 8, the $\frac{1}{2}$ of 16, is the Difference between 16 and 24.

Example.

Reduce 756 ℔. of *Tripoli* Belladine Silk, of 24 Ounces to the Pound, to 16 Ounces to the Pound.

	Short Way.
756	756
24	378 The $\frac{1}{2}$ added.
3024	1134
1512	

16)18144(1134 Anſwer.

If I have *C.* 155 3 22 of Beef for Sea Uſe, and to be cut into Pieces, *viz.* into $\frac{1}{2}$ Pound Pieces, Pound Pieces, Pound and $\frac{1}{2}$ Pieces, 2 Pound Pieces, 3 and 4 Pound Pieces; and of each of theſe Quantities an equal Number, *i. e.* as many Pieces of 4 Pounds each as of Pieces of $\frac{1}{2}$ Pounds, &c. each, what is the Number.

Anſw. 1455 Pieces and $\frac{6}{11}$, or $\frac{1}{2}$ Piece of each Quant.

TROY WEIGHT.

	℔.	*oz.*	*dwt.*	*gr.*	
In	212	10	17	22	how many Grains?

12 Ounces 1 Pound

2554 Ounces
20 dwt. 1 Ounce

51097 Penny Weights
24 Grains 1 dwt.

204390
102196

1226350 Grains, Anſw.

In 1226350 *Grains* how many *Pounds*, &c.

```
               2|0)
24) 1226350  (   5109|7
    120....      ------
    ---         12)2554   17
     26         ----------------------
     24         lb.. 212  10   17   22
    ---         ----------------------
     235
     216
     ---
      190
      168
      ---
      (22)
```

In 246 Ingots of Silver, each weighing 4 lb. $\frac{1}{2}$ *Troy*, how many Ounces? Anſwer 13284 *Oz.*

Out of 79640 *Oz.* of Silver, how many Snuff-Boxes may be made, each to weigh 3 *Oz.* $\frac{3}{4}$? Anſwer 21237 Boxes, $\frac{5}{15}$ or $\frac{1}{3}$.

What Quantity of Gold muſt there be to make 674 Funeral Rings, each to weigh 3 *dwt.* 12 *Grains.* Anſwer 117 *Oz.* 19 *dwt.*

In 47624 Bars of *Spaniſh Silver*, each 36 *Oz.* $\frac{1}{4}$ how many Ounces? Anſwer 1726370 *Oz.*

CLOTH

CLOTH MEASURE.

Yds. qrs. Nls.
In 246 3 2 how many Nails?
4 *qrs.* 1 *Yard.*

987
4 Nails 1 Quarter

Anſwer 3950 Nails

In 426 Ells *Flemiſh*, how many Ells *Engl.*
3 *qrs.* 1 Ell *Flemiſh.*
5 *qrs.* 1 Ell *Engliſh.* 5)
1278

Engl. Ells $255\frac{3}{5}$ Anſwer.

Or you may multiply by 6 Half Quarters, and divide by 10 Half Quarters, which is ſhorteſt; becauſe in dividing by 10, you only cut off a Figure from the Dividend, and the Work is done.

In 5426 Ells *Flemiſh*, how many Yards?
3

4) 16278

Anſw. $4069\frac{2}{4}$ or $\frac{1}{2}$ a Yard.

In 376 *French* Aulmns, how many Yards?
6 *qrs.* 1 *Fr.* Aulmn.

4)2256

564 *Yards, Anſwer.*

In 564 Yards, how many Aulmns?
4

6)2256

376 Anſwer and Proof.

Ells *Engliſh* are reduced into Yards by adding $\frac{1}{4}$.

More Examples.

In 426 Ells *Engliſh*, how many Yards?
106-2 the $\frac{1}{4}$ to be added.

532-2 *Facit.*

On the contrary, Yards are brought into Ells *Engliſh* by ſubtracting $\frac{1}{5}$.

In 532 Yards $\frac{1}{2}$ how many Ells *Engliſh*?
106 the $\frac{1}{5}$ to be ſubtracted.

Anſwer 426 Ells *Engliſh*.

Ells *Flemiſh* are brought into Yards by deducting $\frac{1}{4}$.

In 5960 Ells *Flemiſh* how many Yards?
1490 the $\frac{1}{4}$ to be ſubtracted.

Anſwer 4470 Yards.

Yards are reduced to Ells *Flemiſh* by adding $\frac{1}{3}$.

In 4470 Yards, how many Ells *Flemiſh*?
1490

Anſwer 5960

Ells *Flemiſh* are brought into Ells *Engliſh* as expreſſed before, *viz.* by multiplying by 6, and dividing by 10; or cutting off the laſt Figure or Cypher.

In 4920 Ells *Flemiſh*, how many Ells *Engliſh*?
6

10)2952,0

Anſw. 2952 Ells *Engliſh*.

Ells *Engliſh* are reduced into Ells *Flemiſh*, by adding a Cypher, and dividing by 6, or by adding $\frac{2}{3}$.

In 4726 Ells *Engliſh*, how many Ells *Flemiſh*?

6)4726,0

Anſ. 7876$\frac{4}{6}$ or $\frac{2}{3}$ Ells *Fl.*

Or thus:

$$\left.\begin{array}{r}4726\\1575\ \frac{1}{3}\\1576\ \frac{1}{3}\end{array}\right\}$$

The $\frac{2}{3}$ to be added.

As before 7879 $\frac{2}{3}$

LIQUID MEASURE.

Tuns. Hhds. Gall.
In 65 2 24 how many Pints of Wine?
4 *Hhds.* 1 *Tun*

262 *Hogſheads.*
63 *Gall.* 1 *Hhd.*

790
1574

16530 *Gallons.*
8 *Pints* 1 *Gall.*

132240 *Pints*, Anſw.

In

8)
In 132240 Pints of Wine, how many Tuns, *&c.*
——— 4)
63) 16530) 262 *Hogſheads.*
126 . . ——— *hhds gall.*
——— *Tuns* 65 2 24 Anſwer.
393
378
———
150
126
———
(24)

In 20 Tuns of Beer how many Quarts?
4 Hogſheads, 1 Tun.
———
80
54 Gall. 1 Hogſhead of Beer.
———
320
400
———
4320 Gallons.
4 Quarts 1 Gall.
———
17280 Quarts, *Anſwer.*

54 Gallons make a Hogſhead of Beer, therefore to bring Firkins into Hogſheads take $\frac{1}{6}$ Part, or divide by 6, and it quotes Hogſheads, becauſe 6 times 9, the Gallons in a Firkin, make 54.

To bring Hogſheads into Barrels add $\frac{1}{2}$, becauſe 18, the $\frac{1}{2}$ of a Barrel, and 36 the whole, make 54, the Hogſhead. To bring Kilderkins into Hogſheads, divide by 3, becauſe 3 times 18 makes 54. Barrels are brought into Tuns, by dividing by 7, as follows:

7)
In 420 Barrels, how many Tuns?
———
60 Anſwer.

Examples.

Admit a Ship's Cargo from the *Canaries*, to be, *viz.* 250 Pipes, 130 Hogſheads, and 150 Quarter Caſks; how many Gallons in all? And allowing every Pint to be a Pound, what the Weight alſo?

Anſwer 44415 Gallons, and 158 Tuns 12 *C* $\frac{1}{2}$.

In 444 Firkins of Ale, how many Pints?

Anſw. 28416.

In 74640 Pints of Beer, how many Barrels?

Anſwer $259\frac{6}{36}$.

In 45 Fats, or Vates of Rheniſh Wine, each of 242 Gallons, how many *Aumn* Caſks, each 42 Gallons?

Anſwer $259\frac{12}{42}$.

Note, *Rheniſh Wine is ſold by the* Aumn, *of about* 42 *Gal.*

In 57 Pipes and 42 Gallons of *Madeira* Wine, how many Puncheons, Hogſheads, and Tierces?

Anſwer 86 Pun. 114 Hhds. 42 Gal. 172 Tier.

In 40 *Tuns, and* 50 *Butts, and* 60 *Pipes of Wine,*
How many Tierces do they make, admit they came from
Rhine? Anſw. 570.

DRY MEASURE.

Laſts Qrs. Buſh. Gall.
In 24 7 6 2 how many Gallons of Wheat?
10 Quarters 1 Laſt.

247 Quarters.
8 Buſh. 1 Quarter.

1982 Buſhels.
8 Gallons 1 Buſhel.

15858

In 40 Laſts of Barley, how many Combes?
Anſwer 800

In 3228 Fats or Vates of Sea-Coal, how many Chaldrons and Scores?

Anſwer { 807 Chaldrons.
$38\frac{9}{21}$ Scores.

In 33 Weys of Salt, how many Quarters, Buſhels, and Pecks?

Anſwer { 165 Quarters.
1320 Buſhels.
5280 Pecks.

In 20 Laſts and 30 Weys of Corn, that's called Rye,
How many Buſhels do they make, if you by Buſhel buy?
Anſw. 2800 Buſhels.

In 38880 Pecks of Sea-Coal, how many Chaldrons?
Anſwer 270

LONG MEASURE.

In 50 Miles how many Barley-Corns in Length?
8 Furlongs 1 Mile

400 Furlongs
220 Yards 1 Furlong

8000
800

88000 Yards
3 Foot 1 Yard

264000 Feet
12 Inches 1 Foot

3168000 Inches
3 Barley-Corns 1 Inch

9504000 Barley-Corns in 50 Miles

In 17490 Square Poles, how many Acres, *&c.*

16|0)1749|0(109 Acres.
16..
149
144
4|0) 5|0(1 Rood.

	Acr.	Rood.	Poles.
(10) Anſwer	109	1	10

Here is a ſmall Name to be brought into a great, and therefore it is perform'd by Diviſion; wherefore I divide the ſquare Poles by 160, the ſquare Poles in an Acre, and the Quotient is Acres, and the Remainder is Poles, which I divide by 40, the ſquare Poles in a Rood, and there comes but one Rood, or ¼ of an Acre, and 10 Poles remain. So the whole is 109 Acres, 1 Rood, and 10 Poles, as by the Work above.

TIME.

I deſire to know how many Days, Hours and Minutes, there are ſince the Birth of our Saviour to the Year 1754?

1754
365 Days in a Year.
8770
10524
5262
640210 Days
24 Hours in a Day
2560840
1280420
15365040
10524 Hours added
15375564 Hours
60 Minutes in an Hour
922533840 Minutes

1754
6 Hours wanting.
10524 Hours added

Here, in regard that there are 6 Hours loſt every Year, (for the Year conſiſts of 365 Days, 6 Hours) I multiply the Year by 6, which produces 10524 Hours to be added to the Product of Hours.

Or it may be done thus: Bring a Year into Hours, in which you will find 8766, by which multiply the Number of Years; and that *Product* by 60, and the laſt *Product* will be the Anſwer; as by the following Work.

Days.	*Hours.*
365	6 a Year
24	Hours 1 Day
1466	
730	
8766	

1754 Years
8766 Hours in a Year
10524
10524
12278
14032
15375564 Hours ſince
60
922533840 Minutes ſince

From the *6th* of *June*, 1682 to the 15*th* of *Auguſt*, excluſive, 1721; how many Days; adding 9 Days for the Leap Years; being 1 Day every 4*th* Year?

Anſwer 14313.

From the 19th of *Auguſt*, 1701, to the 21ſt of *January*, excluſive, 1717; (noting the Leap Years) how many Days? *Anſwer* 5998.

Here follows ſome Queſtions, promiſcuouſly ſet for the Exerciſe of the Learner's Ability.

In 305 *l.* 12 *s.* 7 *d.* how many Half-pence? *Anſwer* 146702.

In 3192 lb. Weight, how many Hundred Weight? *Anſwer* 28 *C.* ½.

In 3 *C.* ¾ of *Tobacco*, how many 12 lb. Boxes? *Anſwer* 35.

In 270 lb. 11 *oz.* 12 *dwt.* how many Penny Weights? *Anſwer* 65032.

In 730 Rix-Dollars, at 4 *s.* 5 *d.* $\frac{3}{4}$, how many Ducats, at 4 *s.* 4 *d*? *Anſwer* $754\frac{118}{208}$, or 2 *s.* 5 *d.* $\frac{1}{2}$ over.

In 3 lb. 10 *oz.* of Gold, how many Mourning Rings, each 2 *dwt* 12 *Grains*? *Anſwer* 368.

In 1260 Quarts, how many Hogſheads of Wine? *Anſwer* 5 Hogſheads.

In 60 Kintals of *Pruans*, how many *C.* Weight, (a Kintal being 100 lb.) *Anſwer* 53 *C.* 2 *qrs.* 8 lb.

In 506 *l.* 12 *s* 2 *d.* how many *Portugal* Reas at 20 for 3 *d*? *Anſwer* $810573\frac{1}{3}$.

In 56 Boxes of Sugar, each 2 *C.* $\frac{3}{4}$, how many *C.* Weight? *Anſwer* 154.

In 4679 Yards, how many Ells *Engliſh*? *Anſwer* $3743\frac{1}{5}$.

In 86 *l.* how many Guineas, at 21 *s.* 6 *d.*? *Anſwer* 80 Guineas.

In 88000 Yards how many Miles? *Anſwer* 50.

In 14760 Ells *Flemiſh*, how many Yards? *Anſwer* 11070 Yards.

In 75 *C.* 3 *qrs.* 20 lb. how many Pounds? *Anſwer* 8504 lb.

In 176 *C.* 2 *qrs.* 24 lb. of *Sugar* at *Jamaica*, (the *C.* Weight being 100 lb.) how many *C.* Weight at *London*, the *C.* Weight being 112? *Anſw.* 157 *C.* 3 *qrs.* 6 lb.

In 6000 *French Crowns* at 57 *d.* each, how many Pounds Sterling? *Anſwer* 1425.

In 34 lb. 6 *oz.* *Troy*, how many Ounces? *Anſwer* 414 Ounces.

In Guineas 90, and in Piſtoles nine,
How many Pence, and what in Sterling Coin.

The Guineas at 21 *s.* } *Anſwer* 24516 Pence, or
and Piſtoles at 17 *s.* } 102 *l.* 3 *s.*

In 46 Packs of Cloth, each Pack 24 Pieces, and each Piece 43 Ells *Flemiſh*, how many Ells *Engliſh* and Yards? *Anſwer* $27820\frac{4}{5}$ *Engliſh* Ells and 34776 Yards.

If I had Nobles Eighty Score, and Marks juſt Fifty-two,
In part of Fourteen Hundred Pounds; What Money reſts
ſtill due? Anſwer 832 *l.*

How many times doth a regular Clock ſtrike in a Year? Anſwer 56940.

In 15400 *Vares* of *Valencia*, 100 of which make 85 Yards *Engliſh*, how many Yards and Ells *Engliſh?* Anſwer 13090 Yds. and 10472 Ells *Engliſh.*

CHAP. VII.

Of TARE *and* TRET, &c.

GRroſs *Weight* is the Weight of a Commodity, with the Weight of the Hogſhead, Cheſt, Caſk, Box, Wrapper, or any Thing elſe that contains the Goods: Or any Quantity given in *Hundreds*, *Quarters* and *Pounds*, is *Groſs Weight.*

TARE is an Allowance made by the Seller to the Buyer, for the Weight of the Hogſhead, Caſk, Cheſt, Box, Bag, *&c.* wherein the Goods are contained. And is ſometimes reckoned at ſo much *per* Bale, Bag, Barrel, Cheſt, *&c.* As in *Silks*, *Cottons*, *Raiſins*, *Capers*; at other times at ſo much *per C.* as 10, 14, 16, or 24 ℔. *per C.* There is alſo a Diſtinction of *Cuſtom-Houſe* and *Invoice* Tare, as in *Tobaccos*, and *Indigoes*, &c. and ſometimes uncertain, as in *Tobaccos* and *Sugars*, happening according to the Size of the Caſks.

TRET is an Allowance of 4 ℔. upon every 104 ℔. *Suttle*, claimed by Free-Men of *London*, (and ſometimes to others alſo) and this is allowed for Waſte and Duſt on ſome Sorts of Goods; as on *Tobaccos*, *Spices*, *Drugs*, &c.

CLOFF is an Allowance of 2 lb. upon every Draught above 3 *C.* Weight to Citizens of *London.*

Neat Weight is what Remains when the Allowances are deducted.

Example.

In 29 Bags of *Hops*, containing *Groſs* 88 *C.* 1 *qr.* 19 lb. *Tare* 4 lb. *per C.* how many *C.* neat.

	C.	*qrs.*	lb.
Groſs	88	1	19
Tare	3	0	17
Neat	85	1	02

C. *qrs.* lb.
88 1 19
4 lb. *per C.*
112)353 *Tare*(3 *C.*
336
(17)

I multiply the given Hundreds by 4, the *Tare* allowed for each Hundred, which produces, with 1 lb. allowed for the Quarter, 353 lb. *Tare*, which I divide by 112 and the Quotient gives 3 *C.* Weight, and 17 lb. remains, which I ſubtract from the *Groſs* Weight, and the Remainder is *C.* 85 1 02 for the neat Weight. See the Work.

When the *Tare* is at ſo much *per C.* Weight, multiply the *Groſs Weight* by the *Tare*, and divide the Product by 112, and the Quotient will be the *Tare.* Or ſubtract the *Tare per C.* from 112, and by the Remainder multiply the *Groſs Weight*, and the Product divide by 112, and the Quotient will be the neat Weight. Or if you multiply the Pounds *Groſs* by the Pounds *Tare*, and divide by 112, the Quotient gives the Pounds Tare.

In 7 Bags of *Cotton*, each 2 *C.* ½, *Tare* 7 lb. *per* Bag, how many Pounds neat?

2 $\frac{1}{2}$ *C.* each
7

17 $\frac{1}{2}$
17
17
17,56 the $\frac{1}{2}$ *C.*

7 Bags
7 ℔. *Tare* each

49 ℔. *Tare*

From 1960 ℔. Groſs
Sub. 49 ℔. Tare

Anſw. 1911 ℔. Neat.

In 27 Bags of Pepper, containing
4 ℔. Bag. —— Tare } Groſs *C.* *qrs.* ℔. 58 3 11 Tare 4 ℔. *per* Bag
108 ℔. Tare
58
58
58,95 for 3 *qrs.* 11 ℔.

[How many Pounds Neat ?] 6591 Pounds Groſs
108 Tare

Anſw. 6483 Pounds Neat.

Three Hogſheads of *Tobacco*, Wt. *viz.*

N°					Tare
1	*C.*	5	1	17	Tare 90 ℔.
2	*C.*	6	2	10	—— 87
3	*C.*	5	3	20	—— 85
		17	3	19	—— 262

17
17 [How many Pounds Neat ?
17
103 Odd Weight

2007 Groſs Pounds
262 Pounds Tare

Anſw. 1745 Pounds Neat.

Four Barrels of *Indigo*, qt. *viz.*

N°	*C.*	*qrs.*	℔.		℔.
1	4	1	10	Tare	36
2 qt.	3	3	20	——	29
3	4	0	19	——	32
4	4	0	30	——	35
How many Pounds neat?	16	2	23	——	132

Anſwer ℔. 1739

Six Hogſheads of *Tobacco*, Wt. *viz.*

	C.	*qrs.*	℔.		℔.
	4	3	21	Tare	76
	5	2	17	——	96
	6	1	20	——	100
	4	3	24	——	84
	7	1	13	——	102
	5	2	26	——	98
Groſs	35	0	09	——	556

Tret. 4 ℔. *per* 104 ℔. and *Cloff* 12 ℔. How many Pounds neat?

35
35
35
3509

3929 Pounds Groſs
556 Pounds Tare

3373 Pounds Suttle
129 ½ Pounds Tret

3243 ½ Reſt
12 Cloff

Anſw. 3231 ½ ℔. Neat Wt.

The *Tret* is always found out, by dividing the Suttle Pounds by 26; becauſe 4 times 26 is 104.

℔.
26)3373(129 ½
26
77
52
253
234
(19)

The Half Pounds in the *Tret* is allowed for the 19 Pounds remaining.

In 5 Barrels of *Nutmegs*, Wt. 18 *C.* ½, and 07 ℔. *Groſs*, *Tare* 30 Pound *per* Barrel; and *Tret* 4 Pound *per* 104 ℔. how many Pounds neat?

	C.	*qrs.*	℔.	
30 ℔. Tare	18	2	07	Groſs
5 Barrels	18			
	18			
150 Tare	18,63			
	2079	Pounds Groſs		
	150	Tare.		
	1929	Reſt		
	74	Tret		
	1855	Anſw.		

26)1929(74 ℔. *Tret*
182
109
104
(5)

When the *Tare* is at ſo many Pounds *per Cent.* or 112 ℔. if it happen to be any even Part of a Hundred Weight, it may be ſooner done by dividing the *Groſs* Weight by that Part, according to the Rule of *Diviſion* of ſeveral Denominations: As admit it to be at 14 ℔. *Tare per Cent.* then take the 8th Part of the *Groſs Weight*, or divide it by 8, becauſe 14 ℔. is the 8th Part of a Hundred Weight, and the Quotient will be the *Tare* in *Groſs Weight*, which ſubtract from the firſt *Groſs Weight*, and the Remainder will be the *Neat Weight*.

Example.

	C.	*qrs.*	℔.	
20 Bags, *qt.* (8)	48	1	24	*Groſs*, *Tare*, 14 ℔. *perC.*
14 Pound *per C.*				
	6	0	06½	*Tare*
Facit C.	42	1	17½	*Neat Weight*

Here I ſay, the Eights in 48, 6 times; then the Eights in 1, 0 times, but turning it into Pounds, that is 28, and

24 in the Place of Pounds make 52; then the Eights in 52, 6 times, and there reſts 4, which I multiply by 4, the Quarters in a Pound, and they make 16; then the Eights in 16, twice, or ½ a Pound. So the *Tare* is 6 *C.* 0 *qrs.* 06 ℔. ½, which I ſubtract from 48 *C.* 1 *qr.* 24 ℔. and the Remainder is 42 *C.* 1 *qr.* 17 ℔. ½, for the Neat Weight; as by the Work above.

If the *Tare* be 16 ℔. *per Cent.* then divide the *Groſs Weight*, by 7, becauſe 16 ℔. is the 7th Part of a Hundred Weight.

Example.

12 Hhds.	*C.*	*qrs.*	℔.	
qt. (7	59	3	14	at 16 ℔. *per Cent.*
Tare	8	2	06	the 5th Part
Neat Wt.	51	1	08	

If the *Tare* be 18 ℔. *per Cent.* then for 16 Pounds work as in the laſt *Example*; and for the 2 Pounds take the 8th Part of the Quotient, and add them together for the whole *Tare*.

If the *Tare* be 20 ℔. *per Cent.* then for 16 Pounds, work as before; and for the 4 Pounds take the 4th Part of that Quotient, and add them together for the whole *Tare*. If the *Tare* be 8, 10, or 12 ℔. *per Cent.* or any leſſer Number; then take the Half of the *Groſs Weight*, which will make it Half Hundreds; then 8 ℔. is the 7th Part of ½ *C.* 10 ℔. is divided into the 7th Part, and 4th of that 7th Part; 12 ℔. into the 7th Part, and half of that 7th Part, &c.

Oil is entered at the *Cuſtom-Houſe* by the Gallon and pays Duty accordingly; yet in uncertain Caſks it is weighed, and the *Tare* allowed is 18 ℔ *per C.* which being deducted, is computed at 7 ℔. ½ *per* Gallon; and reduced thus: Multiply by 94, (that being the Neat Weight of 112) and the Product is the Neat Pounds, which doubled brings them into Half Pounds, which divide by 15, the Pounds in 7 Gallons and $\frac{1}{2}$, the Quotient gives the Content in Gallons, which, if divided by 252, gives Tuns, &c.

Example.

	C.	*qrs.*	lb.
Reduce	124	3	16 into Gallons

```
    124
     94
  -----
    496
   1116
    100
  -----
  11756 Pounds.
      2
  -----
15)23512(1567 7/15 Gallons.
  1/2 Pounds.
  -----
    (7)
```

Oil in certain Caſks, 1 in 20 is allowed for Leakidge, but under 10 none.

In *Candy* Barrels the *Tare* is 29 lb. *per* Barrel; and from *New England*, 50 lb. *per* Barrel.

Admit 50 Barrels of *Oil* from *New-England*, to contain

122 *C.* 3 *qrs.* 12 ℔.
122
122
12296

13760 Poun.
2500 Tare

11260 Neat
11260

15)22520(Half Pounds

Anſw. 1501 ⅓ Gallons

Or Pounds of *Oil* are reduced into Gallons by multiplying the Neat Pounds by 2, and dividing that Product by 3; and that Quotient again by 5, gives the Neat Gallons of 7 ℔. ½ *per* Gallon.

TARES.

Tare of Sugars from	to	
8	19	1
12	15	1¼
15	17	1½

Allom, in Caſks, 12 ℔ *p. C.*
Pot-Aſhes. 10 *ditto*
Argil, or *Argol* in Caſks, 14 *ditto*
Almonds in Bags 14 *ditto*
Raiſins in Frails or Baſkets. 44 ℔. *per* Frail.

Oil 18 ℔. *per C*
Madder in Bales, 28 ℔. *Tare per* Bale.
Ditto in Fats, or Vates, 10 ℔. *per C.*

Many more Examples might be offer'd, but thoſe foregoing I think are ſufficient for the Service and Improvement of any ingenious Perſon.

CHAP.

CHAP. VIII.

The GOLDEN RULE:

Or Rule of Three *Direct.*

THIS is called the *Rule of Three*, from its having Three Numbers to work with to find a Fourth in Proportion to them; which fourth Number is the Anſwer to the Queſtion.

It is alſo called the *Golden Rule*, from its excellent Uſe and Performances in *Arithmetick*.

And ſometimes the *Rule of Proportion*, becauſe the fourth Number bears the ſame Rate or Reaſon to the Third, as the Second to the Firſt.

I. Obſerve, that of the three given Numbers in any Queſtion of this *Rule*, you have two of them always of one Name, or Kind; that is, if one be *Money*, ſo is the other; or if one be *Weight*, the other is ſo alſo: And one of which Numbers muſt be the firſt Number in Stating, and the other the Third; and that muſt always be the Third which moves the Queſtion, and the other of the ſame Kind, muſt be the Firſt Number; and the other Number, which is of another Denomination, always poſſeſſes the middle Place, and evermore of the ſame Kind with the Anſwer, or fourth Number ſought. As for *Example*.

If 12 Ells of *Holland* coſt 36 *s.* what will 456 Ells coſt at that Rate?

Here in ſtating the Queſtion for the Work 456 muſt be the third Number, becauſe that is the Number that aſketh the Queſtion: for 'tis required to know what will

456 Ells coſt? And the other Number of the ſame Name, is to be the firſt, which is here 12; and the laſt Number, which is of the ſame Kind with the Number ſought, or Anſwer to the Queſtion, poſſeſſes the middle Place, and when ſtated for the working ſtands thus:

Ells *s.* *Ells*
If 12 coſt 36 what 456?

II. Whenever it happens, that either one, or both of the extreme Numbers, be of divers Denominations, they muſt be reduced into the loweſt Name mentioned; that is, if they be *Pounds*, *Shillings*, and *Pence*; or *C. qrs.* and lb. then they muſt be reduced into Pence, or Pounds Weight. And if one of the Extremes be of ſeveral Denominations, and not the other, yet muſt both be reduced into one Name; that is, if one conſiſts of *Pounds*, *Shillings* and *Pence*, and the other only of *Pounds*, yet that Number which is only Pounds, muſt be brought into Pence as well as the other, that the firſt and third Numbers may be of the like Name, which always muſt be; that is, if the firſt Number be Feet, the third Number muſt be Feet likewiſe; and if one be Gallons, the other muſt be Gallons alſo, *&c.* as was ſaid before. If the middle Number be of divers Denominations, it muſt be reduced into the loweſt mentioned therein (or lower if there's Occaſion) as well as the firſt or third Numbers.

III. When the Numbers are diſpoſed in ſuch Order, as before directed, and ſtated accordingly, then multiply the ſecond and third Numbers together; that is, the third by the ſecond, or the ſecond by the third, (it being all one) and divide that Product by the firſt Number, and the Quotient of that Diviſion will be the Anſwer, and in the ſame Name with the middle Number; that is, if the middle Number be Shillings, ſo will the Quotient alſo. Or if the middle Number be Pence or Farthings, ſo likewiſe will be the Quotient, or Anſwer.

For the better underſtanding the foregoing Notes and Directions, I ſhall compriſe them under theſe ſhort Heads following, *&c.*

1. That muſt be the third Number, which aſketh the Queſtion.

2. Firſt and third Numbers muſt be of one Name, or ſo reduced.

3. The middle Number, if of divers Denominations, muſt be brought into the loweſt mentioned; or lower, if Occaſion require it.

4. Multiply the ſecond and third Numbers together, and divide that Product by the firſt Number, and the Quotient thence ariſing, will be the Anſwer to the Queſtion, in the ſame Name you left your middle Number in.

The fourth Number, or Anſwer to the Queſtion, if in a direct Proportion, may be found theſe three ſeveral Ways, *viz.*

(1.) By multiplying ſecond and third Numbers together, and dividing the Product by the firſt, and the Quotient will be the Anſwer: As in the 4th Direction above.

(2.) By dividing the third by the firſt, and then multiplying that Quotient into the ſecond Number, and that Product will be the Anſwer.

Tho' all theſe Ways be equally true, and the two laſt very conciſe when either the ſecond or third Terms may be divided by the firſt, yet the firſt is moſt in Uſe.

N. B. *When the firſt Term is an Unit, the Anſwer is found by* Multiplication *only. When the ſecond or third Term is an Unit, then the Anſwer will be found by* Diviſion *only.*

Example

Example 1.

If 12 Ells of *Holland* coſt 36 Shillings, what will 459 Ells coſt at that Rate?

The Numbers being ranked according to the Directions given in the firſt Rule of this Chapter, they ſtand thus:

Ells *s.* *Ells*
If 12 coſt 36, what 456?
36 Second Number.

2736
1368

The firſt Number, 12)16416

2|0) 136|8

Anſw. *l.* 68 08

Here (according to Rule) I multiply the third Number 456 by 36, the ſecond Number, and the Product is 16416, which I divide by 12, the firſt Number, and the Quotient is 1368, which are ſo many Shillings; becauſe the middle Number was left in Shillings: Then them Shillings in the Quotient I bring into Pounds, according to the Rule given in *Reduction*, page 129, by cutting off the Figure towards the Right Hand, and halving thoſe towards the Left, and the Anſwer is 68 *l.* 8 *s.* as may be ſeen in the Work above.

Example 2.

If 456 Ells of *Holland* coſt 68 *l.* 8 *s.* what will 12 Ells coſt at that Rate? *Stated thus as follows.*

Ells *l.* *s.* Ells
If 456 coſt 68 8, what 12?
20

1368
12 Third Number

Firſt Number, 456) 16416 (36 *s.* Anſwer
1368

2736
2736

(0)

Here the Queſtion lies upon 12 Ells, for it is aſked, *What will 12 Ells coſt?* Therefore, in the ſtating, it is the Third Number, (as it is alſo in the Queſtion, but ſometimes it does not ſo happen, that the Numbers in a Queſtion lie in ſuch Order as they ought to do in ſtating) and the other of the ſame Name is the firſt, *viz.* 456; and the middle Number is of the ſame Name you ſeek for, *viz.* Money, for we want to know how much Money 12 Ells will coſt? but here the middle Number is of more Denominations than one, *viz.* of *Pounds* and *Shillings*; and therefore it is brought into the loweſt Name mentioned, to wit, *Shillings*. Then I multiply the ſecond and third Numbers together, and divide their Product by the firſt, and the Quotient is the Anſwer, *viz.* 36 *s.* and is a Proof to the firſt *Example*. And ſo may any Queſtion be proved by ſtating it reverſely, or otherwiſe varying the Queſtion ſeveral Ways.

IV. If after you have divided the Product of the ſecond and third Numbers multiplied together by the firſt Number, any thing remains, the Value of that Remainder may be found, by multiplying the ſaid Remainder by the Parts of the next inferior Denomination, that are equal to one of the Quotient: That is, ſuppoſe the

Quotient is Shillings, and there is a Remainder, that Remainder muſt be multiplied by 12, becauſe 12 of them, *viz. Pence*, (the next lower Denomination,) make one of the Quotient, to wit, a Shilling, and divide that Product by your former Diviſor, the firſt Number, and the Quotient will be the Value of that Remainder, in the Parts aforeſaid. And if any thing yet remain, it muſt be multiplied by the Parts of the next inferior Denomination, that are equal to a Unit of the laſt Quotient, and ſtill divide by the ſame Diviſor, *&c.* And ſo muſt you proceed till nothing remains, or till you have brought it as low as you deſire.

Example 3.

If one Hundred Weight of *Currants* coſt 2 *l.* 09 *s.* 6 *d.* what will 45 C. 3 *qrs.* 14 ℔. coſt at that Rate? *Stated as follows.*

℔. *l.* *s.* *d.* *C.* *qrs.* ℔.
If 112 coſt 2 9 6 what 45 3 14?
20 4
49 183
12 28
594 2d Numb. 1468
367
5138 Third Number.
594 Second Number.
20552
46242
25690
12)
The firſt Number 112)3051972(27249 Pence
224· · · ·
2|0)227|0-9 *d.*
811
784 Anſ. *l.* 113-10-9 *d.* ¾
279
224
557
448
1092
1008
84 Remainder
4
112)336(¾
336
(0)

Here the third Number is brought into the loweſt name mentioned, *viz.* Pounds; therefore the firſt Number, 1 hundred Weight muſt be in Pounds alſo. Likewiſe the middle Number is brought into the loweſt Name mentioned in that. Then the ſecond and third Numbers are multiplied together, and that Product divided by the firſt; and the Quotient is Pence, becauſe the middle Number was reduced into pence; then the Pence in the Quotient are brought into Pounds by *Reduction*; and they make 113 *l.* 10 *s.* 9 *d.* But there is a Remainder of 84; wherefore I conclude that makes ſomething more; therefore I multiply that Remainder by 4, the Parts of the next inferior Denomination, and divide that Product by the former Diviſor, *viz.* 112, and it quotes 3, which is three Farthings, and nothing remains. So that the whole is 113 *l.* 10 *s.* 9 *d.* $\frac{3}{4}$. See the Work.

Example 4.

If 15 Weeks Pay comes to 2 *l.* 12 *s.* 6 *d.* what is that a Year? *Stated thus:*

```
                 Weeks      l.    s.    d.        Weeks
                 If 15 give 2     12    6, what   52 ?
                            20
                            ——
                            52
                            12
                          ————
                           630  2d Number
                            52  3d Number
                          ————
                          1260
                         3150
                        ——————  12)
      1ſt Number  15)32760(   2184 Pence
                     30        ————
                    ———      2|0)18|2
                      27      —————
                      15      l. 9-2 Anſwer
                     ———
                      126
                      120
                      ———
                        60
                        60
                        ——
                       (0)
```

Example 5.

If one Ounce of Silver be valued at 5 *s.* 2 *d.* what is the Value of 240 Ounces 15 *dwt.*

If 1 *oz.* coſt 5 *s.* 2 *d.* what 240 *oz.* 15 *dwt.*
20 12 20
20 *dwt.* 62 4815 Penny Weights
62 2d Number
9630
28890
1ſt Number, 2|0)29853|0
10 Rem. 12)14926$\frac{10}{20}$
4 Farth.
2|0)124|3-10 *d.*
2|0)4|0
Anſw. *l.* 62-3-10 $\frac{1}{2}$
2 *qrs.*

Example 6.

If a Tun of Wine coſt 56 *l.* 14 *s.* what coſts a Quart?

Hbds. *l.* *s.*——*qt.* *d.*
If 4——56 14——1 1008)13608(13 $\frac{1}{2}$ Anſ.
63 20 1008
252 1134 3528
4 12 3024
1008 *qts.* 13608 Pence 504
4
1008)2016($\frac{1}{2}$
2016
(0)

Here the middle Number is reduced lower than is mentioned, that being but Shillings, but I have brought it into Pence, becauſe I would have the Anſwer the ſooner, by not having ſo many Remainders to reduce lower. Here alſo the ſecond and third Numbers are not multiplied together, becauſe 1 would only produce the ſame Figures again; wherefore I only divide the ſecond Number by the firſt and the Quotient is the Anſwer in Pence, agreeable with the middle Number, and the Remainder 504, I multiply by 4, and divide again by 1008, according to the Rule, and the Quotient produces two Farthings more, to be joined to the 13 *d.* So the Anſwer is 13 *d.* ½ the *Quart*, as by the Work may be ſeen.

Example 7.

Suppoſe my Salary be 73 Pounds a Year, what is that a Day?

Days *l.* *Days?*
If 365 give 73 what 1?
20

365)1460(4 *s. per* Day, Anſwer.
1460

(0)

Here the Year is brought into Days, that the firſt Number may agree with the third; and here alſo, I do not multiply by 1, for the Reaſons abovesaid; (for a Unit of it ſelf neither multiplies nor divides) and I cannot divide 73 by 365; wherefore I bring the Pounds into a lower Denomination, *viz.* Shillings, or lower, if there be Occaſion. Then I divide according to Rule, and the Quotient gives 4 *s.* the Day for Anſwer, agreeable to the ſecond Aſſertion of *N. B.* in page 160.

Example 8.

Nutmegs at 4 *d.* $\frac{1}{2}$ per Ounce, what is that the *C.* Wt.

oz. *d.* lb.
If 1 coſt $4\frac{1}{2}$, what 112?
4 16
18 672
112
1792 Ounces.
18 Second Number.
14336
1792
4)32256(Farthings.
12)8064
2|0)67 2
l. 33-12 Anſwer.

Here the middle Number is reduced into the loweſt Name mentioned, *viz.* Farthings, by which I multiply the third, and the Product is Farthings; and according to Rule, I ſhould divide by the firſt Number, but the firſt Number being 1, it neither multiplies nor divides, (as was ſaid before) and therefore the Quotient, or 4th Number is the ſame with the Product of the ſecond and third, which is Farthings, becauſe the ſecond Number was Farthings, which are reduced into Pounds, as above.

I ſhall now ſhew, that many times Queſtions in this Rule may be contracted, and much ſooner wrought by another Method of working; that is only by following the brief Methods of *Multiplication* and *Diviſion*, ſufficiently ſhewn in the 4th and 5th Chapters of this Book.

Example

Example 9.

If 5 Gallons of Brandy coſt 1 *l.* 6 *s.* 8 *d.* what will 63 Gallons or a Hogſhead coſt at that Rate?

The common Way.

G.	l.	s.	d.	G.
If 5 —	1	6	8 —	63

20
26
12
320 2d Numb.
63 3d Numb.
960
1920
5)20160
12)4032 Pence
2|0)33|6
l. 16-16 Anſwer.

The ſhorter Way.

G.	l.	s.	d.	G.
If 5 —	1	6	8 —	63
			9	
	12	0	0	
			7	
1ſt Numb. 5)	84	0	0	
Anſw. *l.*	16	16	0	

In working by the ſhorter way, I do not reduce the middle Number at all, but multiply according to the 14th Rule of the 4th Chapter of this Book, by 7 and 9, they multiplied together making the Quantity 63, which Product I divide by 5, the firſt Number, according to the 10th Rule of the 5th Chapter, and the Quotient is the Anſwer, *viz.* 16 *l.* 16 *s.* as in the common Way. Here in this ſhort Method, the Rule of Stating and Working is followed as in the Common way; for the ſecond and third Numbers are multiplied together, and their Product divided by the firſt, but there is above 20 Figures difference between one way and the other.

Example

Example 10.

If the Wages of 3 Weeks comes to 2 *l.* 3 *s.* 6 *d.* what is a Year's Wages at that Rate?

Common Way.

W. *l.* *s.* *d.* *W.*
If 3——2 03 6—52
20
43
12
522 Second
52 3d
1044
2610
3)27144
12)9048 Pence
2|0)75|4
l. 37-14 Anſ.

Shorter Way.

	W.	*l.*	*s.*	*d.*	*W.*
If	3——	2	03	6—	52
				10	
		21	15	0	
				5	*W.*
l. 2 3 6 }		108	15	0	50
M. by (2) }		4	07	0	2
1ſt N. 3)		113	02	0	52
Anſ. *l.*		37	14		

After I have multiplied by 10, and by 5, which make Fifty, I multiply 2 *l.* 3 *s.* 6 *d.* the middle Number, by 2, which is wanting, and add them together.

Example 11.

If 56 ℔. of Coffee coſt 21 *l.* 11 *s.* 8 *d.* what will 3 ℔. coſt at that Rate?

Common Way.

```
    ℔.      l.    s.   d.
If 56——21    11   8——what 3 ℔.
            20
          ————
           431
            12
          ————
          5180 Second
             3 Third
      ————————(12
   56)15540(277
      112   —————
     ————   2|3-1 ½
       434  —————
       392 l. 1 3 1 ½ Anſwer
      ——————————————
       420
       392
      ————
        28 Remainder
         4
      ————
   56)112(2
      112
      ————
      (0)
```

Shorter Method.

```
If 56——21   11   8——3
                 3
      ——————————  ——
    7)64    15   0
      ——————————  ——
    8) 9    05   0
      ——————————  ——
Anſ. l. 1   03   1 ½
```

Here I divide by the firſt Number at twice, according to the 11th Rule of the Vth Chapter. Here is above 30 Figures difference.

Example 12.

If the Freight of a Ship be 529 *l.* 11 *s.* what muſt be given to A. B. for his $\frac{5}{32}$ Parts?

Pts. *l.* *s.* *Pts.*

If 32—give 529 11——what 5?

20

10591

5

32)52955(165|4

32

209

192

175

160

155

128

Rem. 27

12

32)324(10

32

Rem. (4)

32

Anſw. *l.* 82 14 10 $\frac{4}{32}$, or $\frac{1}{8}$, or half a Farth.

Pts. *Short Way.* *Pts.*

If 32—*l.* 529 11——5

5

4)2647 15

8) 661 18 9

Anſ. *l.* 82 14 10 $\frac{1}{8}$

Here is almoſt 40 Figures difference.

Example 13.

If 72 *C.* of Starch coſt 63 *l.* what will 15 *C.* at that Rate?

C. *l.* *C.*
If 72——63——15? Anſwer *l.* 13 : 2 : 6

Short Way.

C. *l.* *C.*
If 72——63——15
3
———
189
5
———
8)945
———
9)118 $\frac{1}{8}$
———
l. 13 : 2 : 6

☞ Note, *If at any time we know but what Part the ſecond Number is of the firſt; the ſame Part alſo will the 4th Number (or Anſwer) be of the third.* As for Example.

If 10 *s.* gain 2 *s.* what 100 *l.* *Anſwer* 20 *l.*
Which is the 5th Part of 100, as 2 is of 10.

Another ſhort Way.

There is another Way of contracting Queſtions in this Rule, *viz.* by dividing the third Number by the firſt; and by that Quotient to multiply the ſecond, which Product, or Products, will be the Anſwer; as in the following Examples.

Example

Example 14.

If 8 Yards of Cloth coſt 4 *l.* 10 *s.* 8 *d.* what will 24 Yards at that Rate?

Common Way.

Yds. *l.* *s.* *d.* *Yds.*
If 8 —— 4 10 8 — 24?
20
90
12
1088
24
4352
2176
8) 26112
12) 3264
2|0) 27|2
Anſ. l. 13-12

Second ſhort Way.

Yds. *l.* *s.* *d.* *Yds.*
If 8 —— 4 10 8 — 24 (3
3
Anſ. *l.* 13 12 0

Here I divide 24, the third Number, by 8, the firſt Number, and it quotes 3; by which I multiply 4 *l.* 10 *s.* 8 *d.* the middle number, and the Product is the Anſwer, *viz.* 13 *l.* 12 *s.* 0 *d.* as before. But if the Queſtion had been ſtated contrariwiſe, *viz.* If 24 *Yds.* coſt 13 *l.* 12 *s.* what 8 *Yds.*? Then you might have done it by the other ſhort Way, as follows.

Yds. *l.* *s.* *Yds.*
If 24 coſt 13 12, what 8?
8
8)108 16
3) 13 12
Anſ. *l.* 4 10 8

Or thus:
3)108 16
8)36 05 4
As before *l.* 4 10 8

Or divide the firſt Number (when that is greateſt) by the 3d, and by that Quotient divide the 2d, and that laſt Quotient is the Anſwer, as under.

Yds. *l.* *s.* *Yds.*
If 24 coſt 13 12, what 8?
3 3) 4 10 8 Anſ.

When any thing remains (in the ſecond ſhort Method) after you have divided the third Number by the firſt, then the firſt and third Numbers are not proportional; for if they be, there will remain nothing. In this Caſe, I ſay, when any thing remains, you muſt, after you have multiplied the middle Number by the Quotient, or whole Number; then multiply alſo the middle Number by the *Numerator* of the Fraction in its loweſt Terms, and divide that Product by the *Denominator*, and add that Quotient to the former Product of the ſecond Number multiplied by the Quotient, or whole Number aforeſaid. An *Example* or two, will make it eaſy to be underſtood.

But before I proceed, 'twill be neceſſary a little to explain the Meaning of the *Numerator* and *Denominator* of a Fraction, and how to reduce it into its loweſt Terms.

A Fraction or Part of a whole Number, ariſes from *Diviſion*; and what remains after the *Diviſion* is ended, is the *Numerator*, and the *Diviſor* is the *Denominator*. As ſuppoſe your Diviſor is 12, and your Remainder 4, then 4 is the *Numerator*, and 12 the *Denominator*; and if ſet *Fraction-wiſe*, ſtand as follows.

Re-

$$\begin{array}{lcl} \text{Remainder} & 4 & \text{Numerator} \\ \hline \text{Diviſor} & 12 & \text{Denominator} \end{array}$$

And to reduce this (or any other Fraction) into its loweſt Terms, halve the Numerator, and alſo the Denominator; or divide them by 3, 4, 5, &c. or by any of the 9 Digits, that nothing remain in either; for that Figure which divides one without a Remainder, may not do ſo by another, but you muſt divide both Numerator and Denominator by ſuch a Number as leaves no Remainder in either. But if you cannot do ſo, then is the Fraction in its loweſt Terms already.

Example.

Reduce the aforementioned Fraction $\frac{4}{12}$ into its loweſt Terms.

$$\tfrac{1}{2}\ \left\{\frac{4}{12}\right\}\ \frac{2}{6}\ \left\{\frac{1}{3}\right\}\ \textit{Loweſt Terms}$$

$$\tfrac{1}{4}\ \left\{\frac{4}{12}\right\}\ \frac{1}{3}\ \Big\}\ \textit{Loweſt Terms}$$

Here I reduce it by dividing it by 2, or halving it, ſaying the half of 4 is 2, and the half of 12 is 6: Then again, the half of 2 is 1, and the half of 6 is 3: which is as far as I can go, and the Fraction is reduced into its loweſt Terms, *viz.* $\frac{1}{3}$. But if I divide it by 4, it reduces it ſooner; for I ſay the 4's in 4 once, and the 4's in 12 3 times: And ſo it is reduced at once into $\frac{1}{3}$, as *per* Work. And this $\frac{1}{3}$ is equal in Value with $\frac{4}{12}$, for as 1 is the 3d Part of 3, ſo is 4 of 12.

Example 15.

If in 15 Weeks I ſpend *l.* 5-5, what is that a Year?

Common Way.

```
    W.  l.  s.  W.
If 15—5   5—52
       20
     ----
      105
       52
     ----
      210
     525
     ----
15)5460(364
   45··
   ----l. 18-4 Anſwer.
    96
    90
    ----
     60
     60
    ----
     (0)
```

Short Way.

```
   W.  l.  s.  W.
If 15—5   5—52 (3 7/15
             3
       --------
        15  15
         2   9
       --------
Anſw. l. 18  4 { 3)  36  15
               {   --------
               { 5)  12  05
                   --------
                      2  09
```

Here I divide 52 the 3d Number, by 15 the firſt Number and it quotes 3, and the Remainder is 7, by which 7, after I have multiplied by 3, I multiply *l.* 5-5 the middle Number, and the Product is *l.* 36 15, which I divide by 15, the firſt Number, at twice, and the laſt Quotient is *l.* 2-9, which is $\frac{7}{15}$, ſeven Fifteenths of *l.* 5-5, which is added to the *l.* 15-15, the Product of *l* 5-5, multiplied by the Quotient 3, and they make *l.* 18-4, as by the common Way. See the Work.

Example 16.

If 45 *l.* buy 15 *C.* ¾ 12 lb. of *Madder*, what will 200 *l.* buy at that Rate?

```
       Common Way.                     Short Way.
 l.    C. qrs.   ℔.    l.       l.   C. qrs. ℔.       l.
If 45—15    3    12—200     If 45—15  3  12——200(4
                                         4——180
                                      ———————————
     70    1   25
                                   63  1  20 ⎫  (20
                C. qrs.  ℔.                  ⎬ 5— 4/9
 The 4/9 of  15   3    12 ———       7  0  05⅓⎭  (45
                                   ——————————
                                   70  1  25⅓ Anſwer.

                        C.  qr.  ℔.
      45)355200(7893(70   1   25 Anſwer.
```

Here I divide the third Number 200, by 45, the firſt Number, and it quotes 4, by which I multiply the middle Number, *C.* 15-3-12, and the Product is *C.* 63-1-20. But there is a Remainder of $\frac{20}{45}$, which, in its loweſt Terms, is 4 Ninths; wherefore I take the $\frac{4}{9}$ of the middle Number, that is, by multiplying by 4, and dividing by 9, according to Rule, and there is produced *C.* 7 0 5 $\frac{1}{3}$ more, to be added to *C.* 63 1 20, and the Total is *C.* 70 1 25 $\frac{1}{3}$.

Example 17.

If 26 Yards of Broad-Cloth coſt *l.* 12 2 8, what will 248 Yards coſt at that Rate?

```
 Yds.  l.    s.  d.     Yds.
If 26—12     2   8————248?
      20
    ————
     242
      12
    ————
    2912   Ayre's Arith.
     248   p. 105.
   —————
   23296
  11648
  5824
 ————————— 12)
26)722176(27776 Pence] l. 115 14 8 Anſwer.
```

Shorter Way.

```
If 26——12  2  8——248(9
              9     234
    ——————————       ———
     109  04  0       14 | 7
7/13   6  10  8       —— | ——
    ——————————        26 | 13
  l. 115  14  8 Anſw.
    ——————————
  13)84   18  8
    ——————————
To be added 6  10  8
```

Example 18.

If 27 Acres of Land let for 17 *l.* 10 *s.* what will 135 Acres come to at that Rate?

```
Ac.       l.   s.        Ac.
If 27————17   10————————135
          20
         ———
         350
         135
         ———
        1750
       1050
       350
      —————————2|0)
  27)47250(175|0
     27···  ————————
     ———— l. 87  10
     202
     189
     ———
      135
      135
      ———
      (0)
```

Shorter Way.

```
If 27—17   10—135(5
            5  135
    ——————————  ———
Anſw. l. 87  10  (0)
```

Thus by one of theſe ſhort Ways may moſt Queſtions in this Rule be anſwered, and much Time and many Figures ſaved I ſhall now only add ſome Queſtions, with their Anſwers, for the Learner's Practice.

19. If 18 Yards $\frac{3}{4}$ of Serge coſt 2 *l.* 5 *s.* how many Yards of the ſame may I have for 300 Guineas at 21 *s.* 6 *d.* each ? Anſwer 2687 $\frac{1}{2}$ Yards.

20. If 37 Acres of Land let for *l.* 13 11 4, what is that an Acre? Anſwer 7 *s.* 4 *d. per* Acre.

21. If I have an Eſtate of 470 *l. per Annum*, what may I expend daily, and yet lay up yearly 130 *l.* Anſwer 18 *s.* 7 *d.* $\frac{1}{2}$ $\frac{90}{365}$.

22. How many Dozen of Stockings at 11 Groats *per* Pair, may I buy for *l.* 190 12 ? Anſ. 86 *Doz.* 7 Pr. $\frac{28}{44}$.

23. Bought 6 Cheſts of Sugar, each 6 *C.* $\frac{3}{4}$, at 56 *s.* *per C.* what come they to ? Anſwer *l.* 113 8.

24 Sold a Piece of Cloth, *qt.* 29 $\frac{1}{2}$ Yards, for *l.* 5 17, what is that *per* Ell *Engliſh*? Anſwer 4 *s.* 11 *d.* $\frac{1}{4}$ $\frac{114}{118}$.

25. *A* owes *B l.* 296 17, but he compounds for 7*s.* 6*d.* in the Pound, what muſt *B.* receive for his Debt ? Anſwer *l.* 111 6 4 $\frac{1}{2}$.

26. If the Intereſt of a 100 *l.* for a Year, comes to 6 *l.* what is the Intereſt of *l.* 315 12 6, for the ſame Time ? Anſwer *l.* 18 18 9.

27. Bought a Caſk of Wine for *l.* 62 8, how many Gallons were in the ſame, when the Gallon was valued at 5 *s.* 4 *d.* Anſwer 234 Gallons.

28. What comes the Commiſſion to, of *l.* 490 12, at *l.* 2 $\frac{1}{2}$ *per Cent* ? Anſwer *l.* 12 5 3 $\frac{1}{2}$.

29. If the whole of a Ship coſt *l.* 1270 10, what doth $\frac{3}{32}$ Parts come to at that Rate ? Anſwer *l.* 119 2 2 $\frac{1}{2}$.

30. If *A* owes *B l.* 395 18, but compounds the whole Debt for *l.* 100 12, what is that in the Pound ? Anſwer 5 *s.* 1 *d.* almoſt, or *s.* 5 0 $\frac{3}{4}$ $\frac{7446}{7918}$.

31. What comes *C.* 19 2 12 of Sugar to, at 5 *d.* $\frac{1}{2}$ *per* Pound ? Anſwer *l.* 50 6 6.

32. Arrived from *Turkey*, 246 Bales of *Tripoly Belladine* Raw Silk, weighing one with another, *C.* 2 $\frac{3}{4}$ at *s.* 18 6, the Pound, of 24 Ounces, what do they amount to ? Anſwer *l.* 46723 12.

33. If I have *l.* 214 a Year, what is that for 19 Weeks? Anſ. *l.* 78 3 10 $\frac{8}{51}$.

34. What comes the Inſurance of *l.* 642 12 6 to, at 4 Guineas *per Cent.* the Guineas at 21 *s.* 6 *d.* Anſw. *l.* 27 12 7 $\frac{3}{4}$.

35. If I buy 100 Yards of Ribbon, at 3 Yards for a Shilling, and 100 of *ditto*, at 2 Yards for a Shilling, and ſell it again for 2 Shillings the 5 Yards, the Queſtion is, *Whether I get or loſe, and how much?* Anſ. I loſe 3 *s.* 4 *d.*

36. Shipt for *Jamaica*, 550 Pair of Silk Stockings, at *s.* 11 6 *per* Pair, and 460 Yards of Stuff, at 14 *d.* *per* Yard; in return of which I have had *C.* 46 $\frac{3}{4}$ of *Sugar*, at *s.* 24-6 *per C.* and 1570 lb. of *Indigo*, at *s.* 2-4 *per* lb. what remains due to me of my *Adventure*? Anſwer *l.* 102-12-11 $\frac{1}{2}$.

Exported,	343	01	8
Imported,	240	08	8 $\frac{1}{2}$
Difference,	102	12	11 $\frac{1}{2}$

37. How long will 1000 *l.* laſt me, if I ſpend no more or leſs than 3 *s.* 6 *d.* *per* Day? Anſwer 15 Years 7 Months, (accounting 30 Days to the Month) and 29 Days, $\frac{12}{42}$ or $\frac{2}{7}$.

38. Shipt for the *Straights*, 100 Pigs of Lead, *qt.* *C.* 283 $\frac{3}{4}$ 12 lb, at *l.* 10 17 *per* Fodder of *C.* 19 $\frac{1}{2}$, what come they to? Anſwer *l.* 157 18 9 $\frac{3}{4}$ $\frac{154}{2184}$.

To Rate Town Taxes.

39. Suppoſe *A.* hath an Eſtate of 53 *l.* a Year, and payeth *s.* 5 10 to the Subſidy, what ſhall *B.* pay, whoſe Eſtate is worth 100 *l.* *per Annum*? Anſw. 11 *s.* $\frac{4}{53}$.

40. Admit a Tax or Rate of 39 *l.* is laid on a Town for the building of a Bridge; and the Value of the *Town Rent* is 900 *l.* *per Annum*, what is each Man's Proportion to pay, according to his Rent? If one Man in the Town be worth 100 *l.* a Year, what ſhall he pay to the ſaid Rate, or 39 *l.*? Anſwer *l.* 4-6-8.

Profit

Profit and Loſs.

41. If I buy a Tun of Wine at 9 *l. per* Hogſhead, and ſell it again at 13 *l. per* Hhd. what do I gain *per Cent?* Anſwer *l.* 44 8 10 $\frac{1}{2}$, $\frac{6}{9}$ or $\frac{1}{2}$.

Company.

42. Two Partners join Stocks for a certain Time, *A* puts in 250 *l.* *B* 430 *l.* and in Trade they have gained 340 *l.* what muſt each Man have of the Profit, in Proportion to his Money in Company?

l. 250 A.
430 B.
———
If *l.* 680 —— *l.* 340 —— *l.* 250 Anſw. *l.* 125
If 680 —— 340 —— 430 215
———
Proof, 340

Barter.

43. How many Dozen of Candles, at 5 *s.* 2 *d. per* Doz. muſt I give for *C.* 3 $\frac{1}{2}$ of Tallow, at 37 *s.* 6 *d. per C.*? Anſw. 25 Doz. $\frac{25}{62}$.

Whereas a Noble *and a* Mark, *juſt* 15 *Yards did buy,*
How many Ells of the ſame Cloth for 50 *Pounds had I?*
Anſw. 600 Ells.

If 15 *Pounds coſt* 16 *Pence, of Bread that's made of Rye,*
How many Loaves, of 6 *Pounds each, for Fourſcore Pounds had I?*
Anſw. 3000.

If 5 *Tuns of Logwood coſt* 56 *Pounds,*
How many full Hundreds for 96 *Crowns?*
Anſwer 42 *C.* 3 *qrs.* 12 ℔.

If 15 *Hundred of our Lead coſt* 16 *Pounds in Gold,*
How much of that Saturnian *Ore for* 40 *Pounds is ſold?*
Anſ. *C.* $37\frac{1}{2}$

If 30 *Pence, and* 40 *Groats, buy* 50 *Pints of Wine,*
What is the coſt of 60 *Quarts in current* Engliſh *Coin?*
Anſwer 38 Shillings.

If 9 *Pounds of our* Engliſh *Wool doth* 90 *Pence require,*
The Value of 1 C. *Weight of you I do deſire?*
Anſwer 4 *l.* 13 *s.* 4 *d.*

If the fourth of a Mark *buy the half of a Pound,*
How much Cochineal *can I have for a Crown?*
Anſwer 9 Ounces.

If 16 *Shillings and a Crown, for* 13 *Weeks ſupply,*
For Meat and Drink, that is, my Board, how much a
Day gave I?
Anſwer 2 *d.* $\frac{3}{4}$ *per* Day.

If that a Rule of 3 *Foot long doth give* 5 *Foot in Shade,*
And if a Steeple 99, *how many Feet is't made?*
Anſwer 59 Feet $\frac{2}{5}$.

To prove the Rule of Three Direct.

Multiply the fourth Number, or Anſwer to the Queſtion, by the firſt; then multiply the ſecond and third Numbers together, and if the Product be alike, the Work is right.

For Trial of which, let us prove the Firſt Queſtion in this *Rule*, which was,

If 12 Ells coſt 36 *s.* what 456 Ells?

And the Anſwer there found, or fourth Number, was 1368 Shillings; the which multiplied by the firſt Number 12, produces 16416; then multiply alſo the ſecond and third Numbers together; to wit, 36, and 456, and the Product is alſo 16416; wherefore the Anſwer is right.

But obſerve well, that when there is any Remainder, after you have divided the Product of the ſecond and third Numbers, by the firſt, ſuch Remainder muſt, in the Proof be added to the Product of the firſt and fourth Numbers, which muſt be equal to the Product of the third Number, multiplied by the ſecond.

If 456 Ells coſt *l.* 68 8 what 12 Ells? Anſ. 36 *s.*

As in the ſecond *Example* of this Rule.

CHAP IX.

The Rule of Three Inverſe.

I. IN this Rule, the 4th Number ſought, bears the ſame Proportion to the firſt, as the ſecond does to the third Number.

II. The ſtating of the Queſtion in this Rule differs not from the Method of Stating in the *Direct Rule*; for the Number that asketh the Queſtion, muſt be the third Number here, as well as there, &c. And to know when the Queſtion belongs to this *Rule*, and when to the *Direct*, obſerve this General Rule.

When the Queſtion is ſtated, conſider whether the 4th Number, or Anſwer, ought to be more or leſs than the ſecond Number, (which is eaſily known) if more, then the leaſt of the two extreams muſt be your Diviſor; but if it ought to be leſs, then the biggeſt of the two Extreams muſt be your Diviſor. [*Here the firſt and third Numbers are called Extreams with reſpect to the ſecond.*] If the firſt Number is the Diviſor, then the Queſtion belongs to the *Direct Rule*; but if the third is the Diviſor, then the Queſtion pertains to the *Rule of Three Inverſe.*

III. In this Rule you muſt multiply firſt and ſecond Numbers together, and divide that Product by the third, and the Quotient is the Anſwer, in the ſame Name with the middle Number.

In this Rule *Note alſo*, That when the third Number is leſs than the firſt, then the Anſwer required will be greater than the ſecond.

Or, when the third Number is greater than the firſt, the Anſwer will be leſs than the ſecond.

Example 1.

If 6 *Mowers* can mow a common Field in 12 Days, in what time will 24 *Mowers* do it in? *Anſwer*, in 3 Days. *Thus ſtated.*

If 6——require 12——what 24?
6 First Number

Third Numb. 24)72(3 Days, the *Anſwer*
72

(0)

Here I conſider the fourth Number, or Number ſought, requires leſs than the ſecond; for the more the Hands the leſſer the time, and therefore the greater of the two Extreams muſt be the Diviſor, which is the third Number, therefore the Queſtion is to be anſwered by the *Rule Inverſe*. Wherefore, according to *Rule* the 3d, I multiply firſt and ſecond Numbers together, and divide by the third, and the Quotient is the Anſwer, *viz.* 3 Days; as in the preceding Work.

Here, as the third Number contains the ſecond twice, ſo doth the fourth contain the firſt, according to the firſt *Rule* of this Chapter.

Example 2.

If when Wheat is 4 *s.* the Buſhel, the 20 Penny Loaf weigh 18 ℔. what muſt the ſaid 20 Penny Loaf weigh when Wheat is 6 *s.* the Buſhel? *Anſwer* 12 ℔.

If 4 give 18, what 6?
4
———
6)72(12 ℔. Anſw.

Here alſo the fourth Number requires leſs; for the dearer the Wheat, the leſſer or lighter the Loaf: So therefore, the greater of the two Extreams, *viz.* 6, is the Diviſor, which being the third Number, denominates the Queſtion to be *Inverſe.*

Example 3.

Admit I lend a Friend on his Occaſion, *l.* 100 for 6 Months, and he promiſes me the like Kindneſs when I deſire it; but when I came to requeſt it, he could lend me but 75 *l.* the Queſtion is, to know how long I may keep his Money, to recompence my Courteſy to him? *Anſwer*, 8 Months.

If 100 give 6, what 75?
6
———
75(600(8 Months, *Anſw.*
600
———
(0)

Here it is apparent, the leſſer the Sum, the more the Time; and therefore the leſſer Extream is the Diviſor, which is 75.

Example 4.

How many Dollars at 4 *s.* 4 *d.* muſt be given for 360 *Guilders*, at 2 *s.* 2 *d.* *Anſwer* 180.

s. *d.* *s.* *d.*
If 2 2 give 360, what 4 4
12 26 12
26 2160 52
720
52)9360(180 Dollars
52
416
416
(0)

Here the more the Value, the fewer the Pieces, and therefore the bigger of the Extreams is the Diviſor, which is the 3d Number, and therefore it is *Inverſe*.

Example 5.

If 100 *l.* Principal gain 5 *l.* Intereſt in 12 Months, what Principal will gain as much in 5 Months? *Anſwer*, 240 *l.*

M. *l.* *M.*
If 12——100——5
12
5)1200
l. 240 *Principal.* Anſwer

Example 6.

When an Acre of Land doth contain 4 Poles in Breadth, and 40 in Length; what muſt be the Length when there is 13 Poles in Breadth? *Anſw.* 12 *P.* $\frac{4}{13}$, or 5 *Foot*, $\frac{1}{13}$. See the Work.

P. B. *P. L.* *P. B.*
If 4 give 40, what 13?
4
13)160(12
13
30
26
4
16 $\frac{1}{2}$
64
2 the $\frac{1}{2}$ of 4
13)66(5 Foot $\frac{1}{13}$
65
(1)

Here the Breadth is more, and therefore the Length muſt be leſs.

Example 7. A Room 30 Foot long and 18 Foot wide, is to be covered with painted Cloth, how many Yards of *Holland Duck* of $\frac{3}{4}$ wide, will cover it?

Anſwer 240 Foot or 80 Yards.

Example 8. If a Man performs a Journey in 6 Days when the Day is 8 Hours long, in what Time will he do it, when the Day is 12 Hours long? *Anſw.* in 4 Days.

Example 9. If 150 Pioneers caſt a Trench in 24 Hours, how many muſt be ſet on to perform it in 6 Hours? Anſw. 600 Pioneers.

Ex. 10. If a Piece of Graſs will graze 56 Oxen 6 Days, how many muſt be turned out, that it may laſt the remaining Oxen 16 Days? Anſw. 35 Oxen out, 21 ſtay.

Ex. 11. How much Shalloon, of 3 *qrs.* wide will ſerve to line 9 Yards of Cloth, of 7 *qrs.* wide? Anſw. 21 *Yds.*

Ex. 12. If 10 Pounds worth of Wine, at 18 *d.* the Bottle, accommodate 30 Men, how many will the ſaid ten Pounds entertain with Wine at 3 *s.* 6 *d.* the Bottle? Anſw. 12 $\frac{36}{42}$ Perſons.

Ex. 13. If for 5 *l.* 5 *s.* I have 14 *C.* Wt. carried 136 Miles, how many Miles may I have 24 *C.* carried for the ſame Money? Anſw. 79 $\frac{1}{2}$ Miles.

Ex. 14. In 730 *German* Rix Dollars, at 4 *s.* 5 *d.* $\frac{3}{4}$, how many *Venetian* Ducats at 4 *s.* 4 *d.*? Anſ. 754 $\frac{118}{208}$.

Ex. 15. How many Pounds of Coffee, at 5 *s.* 9 *d.* *per* ℔. is equal in Value to 426 ℔. of *Tea*, at 13 *s.* 4 *d.* *per* ℔.? Anſw. 987 $\frac{57}{69}$.

Ex. 16. If 60 Ells *Engliſh* be equal to 100 Ells *Flemiſh*, and each Ell *Engliſh* contains 20 Nails of a Yard, how many ſuch Nails doth the *Flemiſh* contain? Anſw. 12 Nails.

Ex. 17. *If* 14 *Men in* 15 *Days, build* 16 *Rod of Wall,*
How many Men muſt be added to do't in 2,
that's all? Anſw. 105 Men.

CHAP. X.

The Double Rule of Three Direct.

I. QUESTIONS in this Rule have five given Numbers, to find a ſixth in Proportion.

II. Any Queſtion in the *Double Rule of Three* may be anſwered by two *Single Rules of Three*; that is, at two Statings, *&c.* are by one Rule compoſed of the five given Numbers.

III. Three of the five given Numbers imply a Suppoſition, and the other two a Demand.

Example 1.

If 100 *l.* in 12 Months gain 6 *l.* Intereſt, what will 25 *l.* gain in 4 Months?

Here the Suppoſition lies on the firſt Numbers, *viz.* 100, 12, and 6, for it is ſaid, If (or ſuppoſe) 100 *l.* in 12 Months gain 6 *l.* Intereſt; and the Demand lies on the two laſt Numbers, *viz.* 25 and 4; for it is demanded what will 25 *l.* gain in 4 Months?

IV. In your firſt ſtating, you muſt obſerve always to make that the ſecond Number, which is of the ſame Denomination with the Number required; and one of the other Numbers in the Suppoſition, (it matters not which) muſt be the firſt Number; and that Number in the Demand of the ſame Name with the firſt, muſt be the third Number; and then your firſt ſtating will ſtand thus:

l. P.		*l. I.*		*l. Principal.*
If 100	gain	6,	what	25?

Here the 2d Number is of the ſame Name with the Number required; for the Intereſt of 25 *l.* is required; and the ſecond Number is Pounds Intereſt: and the firſt Number is Pounds Principal; and ſo is the third Number 25, being one of the Numbers in the Demand. And being ſo ſtated, I work as in the *Single Rule of Three*, thus:

If

l. P. *l. I.* *l. P.*
If 100——gain 6,——what 25
6
l. 1|50
20
10|00 Anſwer 1 *l.* 10 *s.*

Here I cut off two Figures towards the Right Hand, which is dividing by 100, according to the Directions given in *Diviſion.*

And now having found the Intereſt of 25 *l.* by this firſt Operation, I proceed to the ſecond: And Note always, *That the Anſwer to the firſt Stating is the middle Number to the ſecond*; as thus:

Mo. *s.* *Mo.*
If 12——give——30,——4?
4
12)120
10 *s.* Anſwer

Here in the ſecond State, the remaining Number in the Suppoſition is the firſt; and the other of the ſame Name in the Demand, is the third Number, and the middle Number is of the ſame Name we ſeek for; *viz.* Intereſt; and is the Anſwer to the Queſtion, *viz.* 10 *s.*

And thus by theſe two Operations in the *Rule of Three*, I find the Anſwer to the Queſtion, *viz.* That if 100 *l. Principal* in 12 Months, gain 6 *l.* Intereſt, then 25 *l. Principal* will gain ten Shillings Intereſt in 4 Months.

The ſame Anſwer will alſo be found, if you work after the following Manner:

If 12 gain 6, what 4?

4

12)24

2 *l.* Anſwer.

If 100 *l.* gain 2 *l.* what 25 *l.*

20 *s.* 40 2d Number

40 10|00 Anſw. 10 *s.*

The middle Number in the laſt Stating is brought into Shillings, otherwiſe I could not have divided by the firſt Number.

V. The laſt Queſtion, or any other in this Rule, may be alſo anſwered by a Rule compos'd of the five given Numbers; (as was ſaid in the IId Rule of this Chapter) after this Manner: State the Queſtion ſo, that the Numbers may ſtand in one continued Rank, and in ſuch Order, that the firſt and fourth Numbers may be of one Denomination, and the ſecond and fifth.

Then multiply the two firſt Numbers together, for a Diviſor; and the three laſt together for a Dividend, and the Quotient will be the Anſwer, in the ſame Name with the middle or third Number; for the Trial of which, let us take the laſt *Example*, *viz.*

```
        (1)   (2)          (3)        (4)  (5)
        l. P.  M.          l. I.      l. P. M.
     If 100 in 12, gain 6, what 25 in 4 ?
         12             20
       ------         ------
       1200            120
                        25  4th Number
                      ------
                       600
                      240
                      ------
                      3000
                         4  5th.
                      ------
     Diviſor  12|00)120|00
              -------------
                        10 Shillings Anſwer.
```

Here the Queſtion is ſtated, and worked as before directed; and the Anſwer is 10 *s.* as it was when wrought at two Operations.

If the foregoing Directions are heedfully attended to, they are ſufficient for any one's Inſtruction in the *Double Rule of Three Direct*; and alſo for the working of any Queſtion therein, by the Rule compoſed of five Numbers, and therefore I ſhall only add ſome Queſtions, with their Anſwers, and ſo proceed to the next Rule.

Example 2. If 750 Buſhels of Oats ſerve 500 Horſes, 5 Days, how many Buſhels will ſerve 1000 Horſes 14 Days? Anſwer 4200 Buſhels.

Ex. 3. If 96 Acres of Graſs be mowed by 16 Men in 8 Days, how many Acres will be mowed by 36 Men in 38 Days? Anſwer 1026 Acres.

Ex. 4. If 1000 lb. of Beef or Pork ſerve 250 Seamen 7 Days, how many Pounds of *ditto* will ſerve 550 Seamen 63 Days or 9 Weeks? Anſwer 19800 lb.

Ex. 5. If a Carrier receive 30 *s.* for the Carriage of 3 *C.* Weight 150 Miles, what muſt he receive for the Carriage of 7 *C.* Weight 50 Miles? Anſwer 23 *s.* 4 *d.*

Ex. 6. If 100 *l.* in 12 Months gain 5 *l.* Intereſt, what will 63 *l.* gain in 6 Months at that Rate? *Anſwer*, *l.* 1-11-6.

Ex. 7. If 6 Quarters of Malt are ſufficient for a Family of 12 Perſons, for 3 Months, how many Quarters will ſerve a Family of 24 Perſons 12 Months? *Anſwer*, 48 Quarters.

Ex. 8. If a Perſon takes in 320 *l.* to pay Intereſt for the ſame, and at the End of 12 Months, pays for Principal and Intereſt *l.* 339-4; the Queſtion is, at what Rate *per Cent. per Annum* did he pay Intereſt? *Anſwer*, 6 *per Cent. per Annum.*

Ex. 9. If 15 *s.* pay 5 Men for 6 Days, how much will pay 20 Men for 10 Days? *Anſwer*, 5 *l.*

Ex. 10. If 36 Buſhels of Wheat in one Year yield 216 Buſhels, how much will 36 Quarters yield in 6 Years? *Anſwer*, 10368 Buſhels.

CHAP. XI.

The Double Rule of Three Inverſe.

QUESTIONS in this Rule are wrought by two ſingle *Rules of Three*, as thoſe in the foregoing Rule; but you are to obſerve, that one of the Statings (and never but one) will fall out to be *Inverſe*, and muſt be worked accordingly.

Any Queſtion in this Rule alſo, may be anſwered by the compound Rule of five Numbers; obſerving to make the ſecond and fourth Numbers of like Name, and the third and fifth; then multiply the third and fourth Numbers together for a Diviſor, and the other three remaining Numbers together for a Dividend, and the Quotient will be the Anſwer in the ſame Name with the firſt Number.

Example 1.

If 50 Pioneers in 6 Days caſt a Trench 30 Yards long, how many Pioneers will caſt a Trench 200 Yards long in 3 Days? *Anſwer*, $666\frac{2}{3}$ Pioneers.

D. *Pion.* *D.*
If 6 require 50 what 3
6
3)300
100

Yds. *Pion.* *Yds.*
If 30 require 100 what 200
100
3|0)2000|0
$666\frac{2}{3}$

If 30 require 50 what 200.
50
3|0)1000|0
Anſwer $333\frac{1}{3}$

If 6 require $333\frac{1}{3}$ what 3
6
3)2000
$666\frac{2}{3}$

Here the Queſtion is anſwered by two ſingle *Rules of Three*, two different Ways, as in the foregoing Work may be ſeen; and the firſt Stating in the firſt Way falls out to be *Inverſe*, but the laſt in the ſecond Way does not the ſame; for both Statings are never *Inverſe*, as was ſaid before.

Or it may be done by the compound Rule of five Numbers, thus:

(1) (2) (3) (4) (5)
P. *D.* *Yds.* *D.* *Yds.*
If 50——6—30——3—200
3 6 Second
90 1200
50 Firſt
9|0)6000|0
Anſw. $666\frac{60}{90}$ or $\frac{2}{3}$

Example 2. If 100*l.* Principal in 12 Months gain 6*l.* Intereſt, what Principal will gain 18*l.* in 15 Months? *Anſwer*, 240*l.*

Example 3. If a Perſon travels 320 Miles in 10 Days, when the Day is 12 Hours long, in how many Days may he travel 600 Miles, when the Day is 15 Hours long? *Anſwer*, 15 Days.

Example 4. if 36*l.* ſerve for the Board of 12 Perſons 6 Weeks, how long, or how many Weeks will 260*l.* ſerve for the Board of 36 Perſons? *Anſwer* 14 $\frac{4}{9}$ Weeks.

CHAP. XII.

Rules of PRACTICE.

THESE Rules are moſt compendiouſly contrived for the ſpeedy caſting up of any Sort of Goods, or Merchandize; and therefore are of excellent Uſe among *Merchants*, *Tradeſmen*, &c. for their quick and elegant diſpatch of Buſineſs; and, from their frequent Uſe, are called Rules of *Practice*.

Any Queſtion in the *Rule of Three*, that hath a Unit, or 1 for its firſt Number, may be much ſooner done by theſe brief Rules, than by the Method followed in that, as too much abounding in Figures.

In order for working, the following Tables are to be well underſtood, and perfectly got by Heart.

The Even Parts of Money.

Parts of a Shill. d.			*Of a Pound.*
6	is,	$\frac{1}{2}$	or $\frac{1}{40}$
4		$\frac{1}{3}$	$\frac{1}{60}$
3		$\frac{1}{4}$	$\frac{1}{80}$
2		$\frac{1}{6}$	$\frac{1}{120}$
$1\frac{1}{2}$		$\frac{1}{8}$	$\frac{1}{160}$
1		$\frac{1}{12}$	$\frac{1}{240}$
3 Farthings			$\frac{1}{320}$
1 Half-penny			$\frac{1}{480}$
1 Farthing			$\frac{1}{960}$

Parts of a Pound. s.	d.		
10	0	is	$\frac{1}{2}$
6	8		$\frac{1}{3}$
5	0		$\frac{1}{4}$
4	0		$\frac{1}{5}$
3	4		$\frac{1}{6}$
2	6		$\frac{1}{8}$
2	0		$\frac{1}{10}$
1	8		$\frac{1}{12}$
1	0		$\frac{1}{20}$

The Even Parts of Weight.

Pts of a Tun. C.		
10	is	$\frac{1}{2}$
5		$\frac{1}{4}$
4		$\frac{1}{5}$
$2\frac{1}{2}$		$\frac{1}{8}$
2		$\frac{1}{10}$
$1\frac{1}{4}$		$\frac{1}{16}$
1		$\frac{1}{20}$

Pts. of C Weight.		
2 *qrs.*	is	$\frac{1}{2}$
1 *qr.*		$\frac{1}{4}$
0 16 lb.		$\frac{1}{7}$
0 14		$\frac{1}{8}$
0 8		$\frac{1}{14}$
0 7		$\frac{1}{16}$

Pts. of $\frac{1}{2}$ C. and $\frac{1}{4}$ C.			
28	is	$\frac{1}{2}$	$\frac{1}{2}$ *C*
14		$\frac{1}{4}$	
8		$\frac{1}{7}$	
7		$\frac{1}{8}$	
14	is	$\frac{1}{2}$	$\frac{1}{4}$ *C*
7		$\frac{1}{4}$	
4		$\frac{1}{7}$	

I. When the Price of the Integer is a Farthing, take the 4th Part of the given Number (or divide it by 4) and the Quotient is Pence, and if any thing remain, it is Farthings, then them Pence divide by 12 and by 20: Or you may take the 6th Part of the given Number, and the Quotient will be three Half-pences, and them divide by 8 and by 20. Or elſe you may take the 12th Part, and the Quotient will be Three-pences. *Examples* of theſe ſeveral Ways follow, *viz.*

4)987654

4)987654 ℔. of *Caſt Iron*, at ¼ *per* ℔.

12)246913—½ *Rem. becauſe the Dividend was Farthings*

2|0)2057|5—1 *d.*

l. 1028-16-1 ½ *Anſwer.*

Again.

6)987654

⅛)164609 Three Half-pences

2|0)2057|6—1 *d.* ½ *Becauſe the Dividend was Three Half-pences*

l. 1028-16-1 ½ *Anſwer.*

Once more.

12)987654

Three Pences ¼)82304-1 ½

2|0)2057|6

Anſ. l. 1028 16 1 ½.

I have often obſerved, that Learners are many times in doubt concerning the ſeveral Remainders, what to call, or account them; wherefore let them note once for all, That at any Time, whatever remains, it is always of the ſame Name with that you account the Dividend; that is, if the Dividend is accounted Farthings, or Pence, or Shillings, &c. ſo is the Remainder to be reckoned. Or, to repreſent it more intelligibly, the Remainder is always ſuch a Part of a Shilling (if you take Parts of a Shilling) as you take for, whether a $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, or $\frac{1}{12}$; that is the Remainders are either Six-Pences, Groats, Three-Pences, &c. according to the Part you take. And ſo likewiſe for the even Parts of a Pound, you may be governed by the ſame Rules.

II. When the Price given is $\frac{1}{2}$ *d.* then take the 12th Part of the given Number and the Quotient will be Six-Pences; of which take the Half and they are Shillings, which divide by 20, by halving them, &c. to bring them into Pounds.

12)5670 ℔. Copperas, at $\frac{1}{2}$ *d. per* ℔.

6 *d* | $\frac{1}{2}$ | 472—3

2|0)23|6

l. 11-16 3 *Anſw.*

℔. *Or thus:*

$\frac{1}{2}$)5670 *Sea-Bread* at $\frac{1}{2}$ *d.*

1 *d.* $\frac{1}{12}$)2835

2|0)23|6—3 *d.*

l. 11-16-3 *Anſw.*

In the ſecond Work I take the $\frac{1}{2}$ of the Half-Pence, and they make Pence, of which I take the $\frac{1}{12}$, a Penny being the $\frac{1}{12}$ of a Shilling, &c.

III. When the Price is 3 Farthings, take the $\frac{1}{2}$ of the given Number of Integers, and that half is 3 Half-pennies, or the 8th Part, and they are Six-pences; which either divide by 8, and by 20, or by $\frac{1}{2}$, and by 20, &c.

$\frac{1}{2}$ 4720 Ells Canvas, at $\frac{3}{4}$.

$\frac{1}{8}$ 2360

2|0)29|5

l. 14-15 *Anſwer*

Or thus:

$\frac{1}{8}$ 4720 Ells at $\frac{3}{4}$.

$\frac{1}{2}$ 590

29|5

l. 14-15 Anſw.

IV. When the given Price is *Pence*, and an even part of a Shilling, conſider what Part it is, and divide the given Quantity by it, and the Quotient is Shillings; and them Shillings by 20, &c.

1 *d* | $\frac{1}{12}$ | 549 ℔. *Iron* at 1 *d.*
4|5 9 *d.*
l. 2 5 9 *Anſwer*

1 $\frac{1}{2}$ | $\frac{1}{8}$ | 369 ℔. at 1 *d.* $\frac{1}{2}$
4|6 1 $\frac{1}{2}$
l. 2 6 1 $\frac{1}{2}$ *Anſwer*

2 *d* | $\frac{1}{6}$ | 396 *Yards Ribbon* at (2 *d.*
6|6
l. 3 6 *Anſwer*

3 *d* | $\frac{1}{4}$ | 7654 ℔. *Soap at* 3 *d.*
191|3 6
l. 95 13 6 *Anſwer*

4 *d* | $\frac{1}{3}$ | 2486 ℔. at 4 *d.*
82|8 8
l. 41 8 8 *Anſwer*

6 *d* | $\frac{1}{2}$ | 5769 at 6 *d.*
288|4 6
l. 144 4 6 *Anſwer*

Sums in *Practice* admit of various Ways of Working, and equally ſhort, each producing the ſame Anſwer, and ſerve as a Proof to each other, and 'tis very proper, and moſt conciſe, to prove *Practice* by *Practice.* It likewiſe may be proved by the *Rule of Three*; or by reducing the Anſwer into the ſame Name with the Price, and divide it by the Price, and the Quotient will be the given Quantity: Or if you divide by the Quantity, the Quotient will be the Price.

V. When the Price of the Integer is Pence, and no even Part of a Shilling, it may be divided into even parts; as 7 Pence is compoſed of the parts $\frac{1}{4}$ and $\frac{1}{3}$, *viz.* 3 *d.* and 4 *d.* Wherefore, firſt take $\frac{1}{4}$ of the given Number, and then the $\frac{1}{3}$ alſo, and add both Lines together. Likewiſe 9 *d.* is compoſed of the Parts $\frac{1}{2}$ and $\frac{1}{4}$, or 6 *d.* and 3 *d.* and of 4 *d.* of 3 *d.* and 2 *d.* &c. Sometimes it is more conciſe

ciſe to take Parts of Parts: As ſuppoſe 9 *d.* were the Price, I firſt take ½ for 6, and then the ½ of that ½ for the 3 *d.* becauſe 3 *d.* is the ½ of 6 *d.* and then I add the two Lines together. Or, if the Price were 5 Farthings, I take $\frac{1}{12}$ for the Penny, and then the ¼ of that Line for the Farthings, becauſe a Farthing is ¼ of a Penny.

Example.

		342 lb. *Candles* at 5 *d.*
3 *d*	¼	85 6
2 *d*	⅙	57 0
		14|2 6
		l. 7 2 6 *Anſwer*

		429 lb. *Loaf Sugar* (at 9 *d.*
6 *d*	½	214 6
3, ½	6 *d*	107 3
		32|1 9
		l. 16 1 9 *Anſwer*

		679 *Yds. Paving* at 7 *d.*
3 *d*	¼	169 9 *d.*
4 *d*	⅓	226 4
		39|6 1
		l. 19 16 1 *Anſwer*

Or thus:

		429 lb. at 9 *d.*
6 *d*	½	214 6
3	¼	107 3
		32|1 9
		l. 16 1 9 *Anſwer*

		3790 *Yds. Linen* at 10 *d.*
6 *d*	½	1895
4 *d*	⅓	1263 4
		315|8 4
		l. 157 18 4 *Anſwer*

Or thus:

12)37900

315\|8 4

l. 157 18 4

In the laſt Work I put a Cypher to the given Number, which is multiplying by 10, and the Product is Pence, which I divide by 12 and by 20.

1349 lb. *Tobacco*, at 11 *d*.

6*d* $\frac{1}{2}$ 674--6 *d*.
4 $\frac{1}{3}$ 449--8
1 $\frac{1}{4}$ 112--5
of 4 *d*.
123|6--7

l. 61 : 16 : 7 *Anſw*.

Or thus:

1349 lb. at 11 *d*.
Odd Penny--1349

12)14839

123|6--7

l. 61 : 16 : 7 *Anſw*.

4796 Quarts of *Beer* at 5 Farthings.

1*d* $\frac{1}{12}$ 399-- 8
$\frac{1}{4}$ $\frac{1}{4}$ 99--11
of a *Pen*.
49|9--7

Anſw. *l*. 24 : 19 : 7

VI. When the *Price* is *Pence* and *Farthings* then work for the Pence as before; and for the Farthings, obſerve what Part they make, of the Parts taken before, which take out of any one of the Lines, of which the Farthing or Farthings make an even Part, and add all together.

856 *Yds. Ribbon*, at (4 *d*. $\frac{1}{2}$

d
4 $\frac{1}{3}$ 285--4
$\frac{1}{2}$ $\frac{1}{8}$ 35--8
of 4 *d*
32|1 : 0

l. 16 : 1 : 0 *Anſw*.

987 *Yds. Painting*, at (10 *d*. $\frac{3}{4}$

d
6 $\frac{1}{2}$ 493--6
4 $\frac{1}{3}$ 329
$\frac{1}{2}$ $\frac{1}{8}$ 41--1 $\frac{1}{2}$
$\frac{1}{4}$ $\frac{1}{2}$ 20--6 $\frac{3}{4}$

88|4--2 $\frac{1}{4}$

l. 44 : 4 : 2 $\frac{1}{4}$

Here I firſt take the $\frac{1}{3}$ Part of the given Number for the Groat; then for the Half-pence, I conſider it is the 8th Part of 4 *d.* wherefore I take the 8th Part of that Line, *viz.* 285 *s.* 4 *d.* ſaying the 8's in 28, &c.

| 479 lb. *Pepper,*
| ——— (at 9 *d.* $\frac{3}{4}$
6*d* | $\frac{1}{2}$ | 239—6
3*d* | $\frac{1}{2}$ of 6*d* | 119—9
$\frac{3}{4}$ | $\frac{1}{4}$ of 3*d* | 29-11 $\frac{1}{4}$
———
38|9—2 $\frac{1}{4}$
———
l. 19 : 9 : 2 $\frac{1}{4}$ *Anſw.*

| 679 lb. of *Cotton,* at
| ——— (7 *d.* $\frac{1}{2}$
6*d* | $\frac{1}{2}$ | 339—6
1 $\frac{1}{2}$ of 6*d* | $\frac{1}{4}$ | 84-10 $\frac{1}{2}$
———
42|4--4 $\frac{1}{2}$
———
l. 21 : 4 : 4 $\frac{1}{2}$ *Anſw.*

VII. When the Price is any Number of Pence above a Shilling, and not two Shillings, let the given Quantity ſtand as Shillings, and take even Parts for the Pence, and ſet the Quotient underneath in proper Order, without drawing a Line, and add it to the given Number, and the Total will be the Anſwer in Shillings.

Examples.

| 469 *Yds. Stuff,* at
1*d* | $\frac{1}{12}$ | 39-1 *d.* (13 *d.*
———
50|8 1
———
l. 25 : 8 : 1 *Anſ.*

742 *Yds.* at
6*d* | $\frac{1}{2}$ | 371 (19*d.*
1*d* | $\frac{1}{6}$ of 6*d* | 61-10
———
117|4-10
———
l. 58 : 14 : 10

Here 469 ſtands as Shillings, of which I take the 12th Part of the Penny, and add both together: In the *Example,* 742 ſtands as Shillings, of which I take the $\frac{1}{2}$ for the 6 *d.* and 6th part of 371, &c.

2460 lb. *Tobacco*, at (16 *d.*
4 *d.* | $\frac{1}{3}$ | 820

328|0

l. 164 *Anſw.*

Or thus:
3)2460

5) 820

l. 164

420 Ells *Holland*, at (20 *d.* ½
4*d* | $\frac{1}{3}$ | 140
4*d* | $\frac{1}{3}$ | 140
½ of 4*d* | $\frac{1}{8}$ | 17-6

71|7-6

l. 35 : 17 : 6

d | | 794 *Buſh.* of *Oats*, (at 22 *d.* ½
6 | $\frac{1}{2}$ | 397
4 | $\frac{1}{3}$ | 264--8
½ | $\frac{1}{8}$ | 33--1

148|3--9

l. 74 : 8 : 9

Note, That in the ſecond Work of the firſt *Example* above, I divide by 15, according to the 9th Rule of the 5th Chapter; becauſe 16 *d.* is the 15th Part of a Pound, as 15 is the 16th Part. Or when the Price is 14, 16, 18, 21, or 22 *d.* under 2 *s.* if you bring the ſaid Prices into 2 *d*, 3 *d*, 4 *d*, 6 *d*, or 8 Pences, you may bring them into *Pounds*, &c. at one Operation, by taking Parts according to the 2d Table of *Practice*, at the beginning of the Rules of *Practice*.

Examples.

7890 *Yds.* at 14 *d.*
7

2 *d.* $\frac{1}{120}$ | 5523,0 *Two Pences*

Anſw. *l.* 460-5

988 lb. at 15 *d.*
5

[3*d* $\frac{1}{80}$ | 494,0 *Three Pences*

Anſw. *l.* 61-15

6709 lb. at 21 *d.* 3796 at 22 *d.*

7 11

3*d.* $\frac{1}{80}$ | 4696,3 *Three Pences* [2 *d.* $\frac{1}{120}$ 4175,6

l. 587-0-9 *Anſwer l.* 347-19-4

VIII. When the Price given is ſuch a Number of *Shillings*, or *Shillings* and *Pence*, as make an even Part of a Pound, divide the given Quantity by that Part, and the Quotient will be Pounds.

Examples.

1 *s.* 8 *d* | $\frac{1}{12}$ | 374 *Guild.* at 20 *d.* 746 *Gal. Spirits*, at 2 *s.*

Anſw. l. 31-3-4 2 *s.* | $\frac{1}{10}$ | *l.* 74 12 *Anſw.*

In the firſt of theſe *Examples*, I divide the given Quantity by 12, becauſe 20 *d.* is $\frac{1}{12}$ of a Pound, and there remains 2, which is two 1 *s.* 8 *d*'s or 3 *s.* 4 *d.* So the *Anſwer* is *l.* 31-3-4.

IX. When at any Time, the Price is 2 *s.* as in the ſecond *Example* above, the Anſwer may be known as Sight; for it's but doubling the laſt Figure towards the Right Hand, and note it for Shillings, and the other Figures towards the Left Hand are Pounds, as above, the double of 6 is 12 *s.* and the two other Figures are Pounds, *viz.* 74 *l.* in all *l.* 74-12.

From this Notion of underſtanding the Value of any Quantity, at 2 *s.* at Sight, many Things may be very expeditiouſly anſwered, *viz.*

Example.

Examples.

756 *Gal.* at 3 *s.* 6 *d.* *per Gal.*

75-12 at 2 *s.*
$\frac{1}{2}$ 37-16 at 1
$\frac{1}{2}$ 18-18 at 6 *d.*

l. 132- 6 Anſwer.

492 *Yards* at 9 *s.* 4 *d.*

49-4 at 2 *s.*
4 times 2 is 8 *s.*

196 16 at 8 *s.*
24 12 at 1
4 *d.* $\frac{1}{3}$ 8 04 at 4 *d.*

l. 229 12 *Anſwer*

3 *s.* 4 *d.* |$\frac{1}{6}$| 576 lb. *Indigo,*
(at 3 *s.* 4 *d.*
l. 96 *Anſ.*

4 *s* |$\frac{1}{5}$| 749 *pcs.* of Eight,
(at 4 *s.*
l. 149-16 *Anſwer*

5 *s.* |$\frac{1}{4}$| 296 *Yds. Silk* at 5 *s.*
l. 74 *Anſwer*

6 *s.* 8 *d.* |$\frac{1}{3}$| 988 *Gal. Brandy*
(at 6 *s.* 8 *d.*
l. 329-6-8 *Anſw.*

2 *s.* 6 *d.* |$\frac{1}{8}$| 973 *Florins,* at
(2 *s.* 6 *d.*
l. 121-12-6 *Anſ.*

Here 5 *Half Crowns remain,* or 12 *s.* 6 *d.*

10 *s.* |$\frac{1}{2}$| 575 *Yds.* Br. Cloth
(at 10 *s.*
l. 287-10 *Anſwer*

X. When the Price is Shillings and Pence, or Shillings, Pence, and Farthings, and no even Part of a Pound, then multiply the given Quantity by the Shillings in the Price, and take Parts for the Reſt, and add all together.

Examples.

```
756 ℔. Coffee, at 5 s. 8 d.
  5
 -----
d |    | 3780
4 |1/3 |  252
4 |1/3 |  252
 -----
 428|4
 -----
l. 214-4 Anſ.
```

```
436 ℔. Cinnamon,
  9  (at 9 s. 7 d.
 -----
d |    |3924
6 |1/2 | 218
1 |1/6 |  36-4
 -----
 417|8-4
 -----
l. 208-18-4 Anſw.
```

```
570 Qrs. of Wheat, at
 32          (32 s. 6 d.
 -----
  |    |  1140
d |    | 1710
6 |1/2 |   285
 -----
 1852|5
 -----
l. 926-5 Anſw.
```

```
746 C. Cheeſe, at
 27  (27 s. 4 d.
 -----
  |    | 5222
d |    |1492
4 |1/3 |  248-8
 -----
 2039|0-8
 -----
l. 1019-10-8 Anſw.
```

XI. When the Price is Shillings and Pence, and no even Part of a Pound, yet many times it may be divided into even Parts; as 7 *s.* 6 *d.* is compoſed of 5 *s.* and 2 *s.* 6 *d.* and 11 *s.* 8 *d.* of 10 *s.* and 1 *s.* 8 *d.* 12 *s.* 6 *d.* of 10 *s.* and 2 *s.* 6 *d.* 15 *s.* of 10 *s.* and 5 *s.* &c.

```
205 Gal. Tent, at 7 s. 6 d.
 -----
5 s     |1/4| 51-5
2 s 6 d |1/4| 25-12-6
 -----
l. 76-17-6
```

Or thus:

```
                   205
 -----
2 s 6 d 1/8        25-12-6
[3 1/2 Cr. is 7 s 6 d    3
 -----
l. 76-17-6
```

190 Bar. *Orgal*, at
(11 *s.* 8 *d.*
10 *s* | $\frac{1}{2}$ | 95
1 *s* 8*d* | $\frac{1}{12}$ | 15-16-8
l. 110-16-8

172 *C. Iron*, at
(12 *s.* 6 *d.*
10 *s* | $\frac{1}{2}$ | 86
2 *s* 6*d* | $\frac{1}{8}$ | 21-10
l. 107-10 *Anſw.*

XII. When at any Time the Price is an even Number of Shillings, multiply the Quantity by half of the Price, and double the firſt Figure of the Product, and ſet it a-part for Shillings; and the other Figures to the Left Hand will be Pounds.

Examples.

79 Buſh. *Wheat*, at 6 *s*
3 — the half 3
l. 23-14 Anſwer

90 ℔. *Sarſafraſs* at 8 *s.*
4 — 4
l. 36-00 Anſwer

764 *C. Suff.* Cheeſe at 12 *s.*
6 — the half 6
l. 458-8 Anſwer

85 *Yds.* of Cloth at 14 *s.*
7 — 7
l. 59-10 Anſwer

326 ℔. *Mace*, at 22 *s.*
11 — 11
l. 358-12 Anſwer

623 *C. Ginger*, at 24 *s.*
12 — 12
l. 747-12 Anſwer

When the Multiplier conſiſts of two Places (when the Price is an even Number of Shillings) and that it cannot well be work'd to have the Product in one Line; after you have done with the Unit Figure, and come to multiply by the ſecond, obſerve to ſet the firſt Figure of the Product juſt under the ſecond of the firſt Line; for that doubled, and ſet a-part for Shillings, takes up the firſt Place.

756 C. of *Currants*, at 48 *s.*	219 C. at 56 *s.*
24	28
302-8	175-4
1512	438
l. 1814-8 *Facit*	*Anſwer l.* 613-4

When the Price is an even Number of Shillings, if it be required to know what Quantity of any thing may be bought for ſo much Money, it may be known by this ſhort Rule, *viz.* annex a Cypher to the Money, and divide by half of the propoſed Price.

Examples.

How many Pounds of *Indigo* may be bought for 54 *l.* at 4 *s. per* ℔.

2)540

Anſwer 270 ℔.

What Quantity of Cloth at 12 *s. per* Yard may be bought for 236 *l*?

6)2360

Yards 393 $\frac{2}{6}$ or $\frac{1}{3}$ Anſ.

How many Gallons of *Canary* at 6 *s. per* Gallon, may be bought for 250 *l*?

3)2500

833 $\frac{1}{3}$ Anſw.

XIII. When the Price is an odd Number of Shillings, work for the even Part, as in the laſt Rule; and for the odd Shilling take the $\frac{1}{20}$ of the given Number, and add them together, as in the following Examples.

96 *Piſtoles*, at 17 *s.*
8 — 8-1
s. 76-16
1 $\frac{1}{20}$ 4-16
l. 81-12 Anſw.

260 lb. *China Silk*, at 21 *s.*
10 — 10-1
260-00
1 *s.* $\frac{1}{20}$ 13-00
l. 273-00 Anſwer.

XIV. When the Price of the Integer is Pounds, Shillings, and Pence, reduce the Pounds and Shillings, into Shillings, and multiply the given Number of Integers by the ſaid Shillings: And then take Parts for the Pence, as before. Or if the Shillings and Pence make an even Part, or even Parts of a Pound, then multiply the Quantity by the Pounds, and take even Parts of a Pound for the Remainder of the Price, and add the Reſults together. Or when the Price is Shillings above 20, and under 60, you may let the Integers ſtand as Pounds, and (without drawing a Line) take Parts for the odd Money, and add all together, &c.

Examples.

C. *l. s. d.*
426 *Turmerick* at 3-12-6
72 20
852 72
2982
6|$\frac{1}{2}$| 213
3088|5
l. 1544-5. Anſw.

Or thus:
C. *l. s. d.*
426 at 3-12-6
3
1278
10 *s.* | $\frac{1}{2}$ | 213
2 *s.* 6 *d.* | $\frac{1}{4}$ | 53-5
l. 1544-5 Anſ.

316

C. *l. s. d.*
316 *Saltpet.* at 4-15-6
95 20
1580 95
d 2844
6 | ½ | 158
3017|8
l. 1508-18

Or thus:
C. *l. s. d.*
316 at 4 15 6
4
1264
10 *s* | ½ | 158
5 | ½ | 79
6 *d* ⅒ | 7 18
l. 1508 18 Anſ.

XV. If the Quantity given hath any odd Weight or Meaſure annexed to it, as ¼, a ½ or ¾, (after you have work'd as before, for the whole Number) then take ¼ a ½, or ¾ of the Price, and add it to the other Work.

Example.

lb.
256 ½ *Legee* Silk, at (15 *s* 7 *d*
15
1280 ½ 7--9 ½
d 256
6 | ½ | 128
1 | 1/12 | 21-4
for ½ lb. 7-9 ½
½ | 399|7-1 ½
l. 199-17-1 ½ *Anſ.*

lb.
326 ¾ *Saffron*, at 54 *s* 8 *d*
54 *qr.*
1304 ½ | ½ | 27-4
1630 ¼ | ½ | 13-8
163 41-0
54-4
41-0 for the ¾
1786|2-4
l. 893-2-4

When you take for 3 *qrs.* of any thing, firſt take ½ of the given Price, and then the ½ of that ½ and add them together as above. Or you may take the ½ and ¼ Parts and add them together; but the other is eaſier and quickeſt.

C.
246 ¼ *Fuſtick*, at
d 246 (11 *s* 6 *d*
6 ½ 123
¼ 2-10 ½
2829
2-10 ½
1/20 283|1-10 ½
l. 141-11-10 ½ Anſwer

Ells *s.* *d.*
216 ⅕ *Lawns* at 12 9
12
⅕ 2-6 ½
d 2592
6|½ 108
3|½ 54
2-6 ½, ⅖
275|6-6 ½, ⅖
l. 137-16-6 ½, ⅖ Anſw.

C. ℔. *s.* *d.*
134 ½ 14 *Raiſins*, at 31 6 *per Cent.*
31 *C.*
½ 15--9
134 14 ℔. ¼ 3-11 ¼
402
19-8 ¼ for ½ *C.* 14 ℔. 19-08 ¼
417|3-8 ¼
l. 208-13-8 ¼ Anſw.

Here the even Parts of Weight muſt be obſerved, as they are ſet down in the beginning of this Chapter; As for the ½ *C.* you take half of the Price, and for 14 ℔. you take ¼ of 15 *s.* 9 *d.* as it being ¼ of ½ a *C.* &c.

Sums of this Kind, and many others, may as practically be done by *Multiplication* only, (except taking the Parts) as it is taught in the firſt Chapter of this Book.

Examples.

C.		s.	d.
75 ½ *Nicorago* Wood, at		22	6
			8
	l. 9	00	0
			9
	81	00	0
	3	07	6
	0	11	3
	l. 84	18	9

Here I multiply, firſt by 8, and then by 9; 8 times 9 making 72; and for the 3 odd Hundreds wanting, I multiply the Price by 3, and then I take half of the Price for the ½ C. and add them together; as by the Work may be ſeen.

C.		s.	d.
63 ¾ *Allom*, at		12	10 *per* C.
			7
	4	09	10
			9
	l. 40	08	6
		6	5
		3	2 ½
	l. 40	18	1 ½

Here I multiply by 7, and by 9; 7 times 9 making 63 the Quantity.

Hhds.
156 Wine at —— 12 13 *per Hhd.*

		12	
s.		1872	
10	½	78	
2	⅕	15	12
1	½	7	16
	l.	1973	08

Or thus:

l.	*s.*
12	13 *per Hbd.*
	10
126	10
	10
1265	00
632	10
75	18
l. 1973	08 Anſwer

96 *Fodder* of *Lead*, at —— *l.* 8-13-4

		8
		768
13-4	⅔	32
		32
	l.	832 Anſwer

12
104-00-0
8
l. 832-00-0

As for ſhort Methods of caſting up Bills of Parcels, &c. 'tis beſt to do them by *Multiplication*, as is directed in that Rule.

Here follow ſome Queſtions with their Anſwers, for the Learner's Exerciſe.

		£
75 *C.* ½ 19 ℔. at 4 *d.* ½ *per Pound.*	Anſwer	158-18-1 ½
71091 ℔. at 35 *s.* 6 *d. per C.*	Anſw.	1126-13-3 ¾
67108 *oz.* at 16 *d* ¼ *per* ℔.	Anſwer	283-19-8 ½
71 ℔. 10 *oz.* 15 *dwt.* at 5 *s.* 9 *d. per* Ounce.	Anſwer	248-00-9 ¾
319 Yds. at 5 *s.* 6 *d. per* Ell.	Anſwer	70-03-7 ⅕
419 ⅞ Yds. at 4 *s.* 10 *d.* ⅛	Anſwer	101-13-9 1/6 5/4
47 Quarters, at 4 *s.* 9 *d. per* Buſh.	Anſwer	89-06
715 ¼ Yds. at 4 *s.* 10 *d.* ⅛	Anſwer	173-04-5 ⅞

59 *Ounces*, 11 *dwt.* 18 *gr.* at 5 *s.* 7 *d. per Ounce.* Anſ. *l.* 16-12-8

50 ℔. ¾ of Silk, at 20 *d. per Oz.* Anſ. *l.* 67-13-4

66 *Groſs*, at 3 *s.* 9 *d. per Doz.* Anſ. *l.* 148-10-0

56 Load of *Hay*, at 18 *d. per Truſs.* Anſ. *l.* 151-04-0

N. B. 36 *Truſs to the Load.*

Sold 3 Sacks of *Rice*, Contents, *viz.*

N°				*Tare*
1—4	1	10		7
2—3	2	19		8
3—4	0	20		7

Clough 2 ℔. *per* Sack, *Tret* 4 ℔. *per* 104 ℔. at 10 *d.* ½ *per* ℔. Neat.

What comes the 3 Sacks to? Anſ. *l.* 56-4-11

For the deducting of *Tare*, *Tret*, &c. the Learner muſt have Recourſe to the VIIth Chapter of this Book.

Sugar, 95 *C.* 1 *qr.* 19 ℔. *Groſs*, *Tare* 12 *C.* 3 *qrs.* 10 ℔. at 47 *s.* 6 *d. per C. Nt.* what comes the Sugar to at that Rate? Anſ. *l.* 196-2-6 ½

Other TABLES *of the even Parts of a* Shilling *and of a* Pound.

Parts of a Shilling.

10*d*	is	5/6
9	is	3/4
8	is	2/3
7 ½	is	5/8
4 ½	is	3/8

Parts of a Pound.

18 *s.*	is	9/10
17-6 *d.*	is	7/8
16 8	is	5/6
15	is	3/4
14	is	7/10
13-4	is	2/3
12-6	is	5/8
8	is	4/10
7-6	is	3/8
6	is	3/10

If the Price of the Integer be at any of the Rates in either of theſe Tables, multiply the given Quantity by the Numerator, and divide by the Denominator, and the Quotient will be the Anſwer.

Examples.

Examples.

d
10|$\frac{5}{6}$|456 ℔. *Loaf Sugar.*
5 (at 10*d*
6)2280
38|0
l. 19 Anſwer

746 *Yds. paving*, at 4*d.* $\frac{1}{2}$
3
4 *d.* $\frac{1}{2}$|$\frac{3}{8}$|2238
27|99 *d.*
l. 13-19-9 Anſwer

Foot
9*d.*|$\frac{3}{4}$|765 *Glazing*, at 9 *d.*
3
4)2295
57|3-9
l. 28-13-9 Anſwer

℔.
671 *Joppa* Soap at 7 *d.* $\frac{1}{2}$
5
7*d.* $\frac{1}{2}$|$\frac{5}{8}$|3355-4 $\frac{1}{2}$
41|9
l. 20-19-4 $\frac{1}{2}$ Anſwer

C.
18*s.*|$\frac{9}{10}$| 695 *Shoemack* at 18 *s.*
9
1|0)625|5
l. 625-10 *Anſwer*

℔.
694 *Belladine* Silk
7 (at 17 *s.* 6 *d.*
17 *s.* 6 *d.* |$\frac{7}{8}$|4858
l. 607-5 *Facit*

6*s*|$\frac{3}{10}$|950 *Pr. Hoſe* at 6 *s.*
3
285|0
l. 285 Anſwer

842 ℔. *Rhub.* at 13 *s.* 4*d.*
2
13*s* 4*d*|$\frac{2}{3}$| 1684
l. 561-6-8

Other Examples of Practice promiſcuouſly ſet and moſt expeditiouſly wrought.

Gal. *d.*
d. |4|1536 at 15 *p. Gal.*
15 is
$\frac{1}{16}$ of |4| 384
a *l.*
l. 96 *Facit*

℔. *d.*
d. |5|7490 at 16 *p.* ℔.
16 is
$\frac{1}{15}$ of |3|1498
a *l.*
l. 499 $\frac{1}{3}$ *Facit*

8*d.* is |7694 ℔. *Tobacco* at
$\frac{1}{30}$ of | (8*d. p.* ℔.
l. 256-9-4 *Facit*

756 *Gall.* at 5 *s.* 8 *d.*
5 *s.* | $\frac{1}{4}$ | 189
8*d.* | $\frac{1}{30}$ | 25-4
l. 214-4

205 *Yds.* at 7 *s.* 6 *d.*
5 *s.* $\frac{1}{4}$ 51-05
2*s*6*d* $\frac{1}{8}$ 25-12-6
of a *l.*
l. 76-17-6 *Fac.*

170 ℔. *Raw Silk* at
(16*s.* 8 *d.*
10 *s.* $\frac{1}{2}$ 85
6*s.* 8*d.* $\frac{1}{3}$ 56-13-4
l. 141-13-4 *Facit*

40 *s.* {125 *Pcs.* at *l.* 2-5 6 *per Piece.*
{125
5*s.* $\frac{1}{4}$ 31-5
6*d.* $\frac{1}{10}$ 3-2-6
of 5 *s.*
l. 284-7-6 *Facit*

215 *C.* of *Hops*, at
(3*l.* 17*s.* 6*d.*
860
Subt. $\frac{1}{8}$ 26-17-6
l. 833-02-6

s. *d.* 75 *C.* $\frac{1}{2}$ *Logwood* at
2 6 $\frac{1}{8}$ 9-07-6 (22*s.* 6*d.*
the $\frac{1}{2}$ *C.* 11-3
l. 84-18-9 Anſwer.

Days.
365 at 5 *d.* *per Day*
6*d.* $\frac{1}{40}$ 9 02 6
Subt. $\frac{1}{6}$ 1 10 5

l. 7 12 1 Anſw.

C. qrs. ℔.
12 3 14 *Long Pepper,*
at *l.* 3 10 6
12

42 06 0
$\frac{1}{2}$ *C.* the $\frac{1}{2}$ 1 15 3
$\frac{1}{4}$ a $\frac{1}{2}$ of the $\frac{1}{2}$ *C.* 17 7$\frac{1}{2}$
14 ℔. the $\frac{1}{2}$ of $\frac{1}{4}$ *C.* 8 9$\frac{3}{4}$

Facit, l. 45 07 8$\frac{1}{4}$

26812 ℔. at 19 *d.*

20*d.* $\frac{1}{12}$ 2234 06 8
Subt. $\frac{1}{20}$ 111 14 4

l. 2122 12 4

3796 *Yards,* at 22*d.*

20*d.* $\frac{1}{12}$ 316-06-8
2*d.* $\frac{1}{120}$ 31-12-8

l. 347-19-4

℔.
6700 at 21 *d.*

2*s.* $\frac{1}{10}$ 670 18
Subt. $\frac{1}{80}$ 83 17 3
for 3*d.* over

l. 587 00 9 Anſ.

75 C. at 20*s.* 8 *d.*
4*d.* $\frac{1}{60}$ 1 5
4*d.* $\frac{1}{60}$ 1 5

l. 77 10 Anſwer.

When it happens that the Price of the Integer is a known Part of a Pound, as 17 *s.* 6 *d.* is $\frac{7}{8}$, 13 *s.* 4 *d.* is $\frac{2}{3}$ 16 *s.* 8 *d.* is $\frac{5}{6}$, and 7 *s.* 6 *d.* $\frac{3}{8}$, *&c.* then multiply the given Number by the *Numerator*, and divide the Product by the *Denominator :* Or divide by the *Denominator*, and multiply by the *Numerator*. See the following Work.

Examples.

420 *Yds.* at 7 *s.* 6 *d.*
3
8)1260
l. 157-10 *Facit.*

Or thus:
8)420
52 10
3
Anſwer 157 10

479 *Ells,* at 7 *s.* 6 *d.*
7
8)3353
l. 419 $\frac{7}{8}$, or 2 *s.* 6*d.* Anſw.

Subtract $\frac{1}{8}$ from the given Number

Or thus:
l. 59 17 6
7
Facit, l. 419 02 6

697 *Gall.* at 16 *s.* 8 *d.*
5
6)3485
l. 580 $\frac{5}{6}$ or *s.* 16-8 Anſw.

Subtract $\frac{1}{6}$ from the given Numb.

Or thus:
l. 116 03 4
5
Facit, l. 580 16 8

CHAP XIII.

COMPANY.

THIS Rule teaches (by knowing the Parts of which a Joint Stock is compoſed, with a ſuppoſed *Gain* or *Loſs*, reſulting therefrom by Trade) to eſtimate or determine each Perſon's particular Share of the *Gain* or *Loſs* in proportion to his Principal in the Joint Stock.

By this *Rule* may alſo a Bankrupt's Eſtate be divided among his Creditors. Likewiſe Legacies, &c. adjuſted, in Caſe of a Deficiency of Aſſets or Effects; and many other Things.

I. Queſtions in this Rule are work'd by the *Rule of Three*; there being to be as many ſeveral Statings, as there are Members in the Joint Stock, if none of their Stocks be alike.

II. The total Sum of the ſeveral Stocks is to be the firſt Number in the *Rule of Three*; the *Gain* or *Loſs*, the ſecond, and each Man's particular Stock the third.

Example 1.

A and B enter into Partnerſhip; A puts into Stock 230 *l.* and B 320 *l.* and after 12 Months Trade, they have gained 165 *l.* how much muſt each Perſon have of the Gain, in proportion to his Money in Company?

230 *l.* A
320 *l.* B

If 550 gain 165, what 230 *l.* A's Stock?

230

4950
330

55|0)3795|0(69 *l.* A's Share.
330

495
495

(0)

Again, if 550 *l.* gain 165 *l.* what 320 *l.* B's Stock?

320

3300
495

55|0)5280|0(96 B's Share.
495 69 A's Share.

330 165 Proof.
330

(0)

Here I add their ſeveral Stocks together, and they make 550 *l.* which is the firſt Number in the *Rule of Three*; the *Gain, viz.* 165 *l.* the ſecond; and 230 *l.* the Stock of A, the third Number, which makes the firſt Stating, which being work'd according to Rule, the Anſwer gives A 69 *l.* for his Share. Then 'tis again repeated, and then the Stock of B 320 *l.* is the third Number; and after working the ſecond Stating, there ariſes 96 *l.* for the Share of B in the *Gain*, which two Shares being added together, make the total *Gain*, *viz.* 165 *l.* and is a ſure Proof the Work is right; and that each Perſon had his juſt Proportion of the Profit.

Example 2.

Three Perſons, A, B, and C, join in Company; A's Money in Stock is 750 *l.* B's 460 *l.* and C's 500 *l.* and after a certain Time, when they ſettle their Accounts, find their neat Profit 684 *l.* What muſt each have of the *Gain?* 750 *l.*
460
500

If 1710 *l.* gain 684 *l.* what 750 *l.* *Anſ. l.* 300 A
If 1710 gain 684 what 460 184 B
If 1710 gain 684 what 500 200 C

Proof, l. 684

Example 3.

Admit four Perſons make a joint Adventure to Sea. *A* ſends 60 *l.* in Tobacco, *B* 80 *l.* in Cloth, *C.* 120 *l.* in Leather, and *D* 140 *l.* in Silk Hoſe; and after they have diſpoſed of their Returns, their neat Profit amounts but to 72 *l.* what each Man's Share of the ſaid 72 *l*?

		l.	*s.*
If 400 *l.* gain 72 *l.* what 60 *l.*	*Anſw.* *A*	10	16
If 400 gain 72 what 80?	*B*	14	08
If 400 gain 72 what 120?	*C*	21	12
If 400 gain 72 what 140?	*D*	25	04
	Proof, *l.*	72	00

The common Way of having ſo many Statings and Workings, as there are Partners in the Concern, being intolerably tedious, I have here ſet down a much more compendious Method of working Sums belonging to this Rule; and though it is derived from *Decimals*, yet it will well enough anſwer our End by a *Vulgar Operation*, which is this; Annex a Cypher or Cyphers, to the middle Number: (except it be big enough to divide without, which it very rarely is) and then divide it by the firſt Number, or Total Sum of the Stocks; and then, by that Quotient, multiply each Perſon's particular Stock; and the Products will be each Man's proportional Share in the *Gain* or *Loſs*. But you muſt obſerve, that when you have multiplied each Perſon's particular Stock by the Quotient aforeſaid, you muſt point, or ſtrike off to the Right Hand, ſo many Figures or Cyphers, as you annex Cyphers to the Sum to be divided.

Or *Examples* in this Rule may be ſhortened by finding the proportional *Gain* or *Loſs*, of one Pound; thus: Bring the *Gain* or *Loſs* into Pence, and divide thoſe Pence by the Total of the Stocks, and the Quotient ſhews what it is *per* Pound; and then the Anſwers may be ſound by the Rules of *Practice*, *&c.*

Example *by the ſaid propoſ'd Method.*

For a Specimen, let us take the firſt *Example* in this Rule, where the Sum of the Stocks was 550*l.* and the total Gain 165 *l.* Here I cannot divide 165 by 550; wherefore I join a Cypher to 165, thus, 1650; and then divide it by 550, and the Quotient is 3; by which I multiply 230*l.* the Stock of A, and it produces 690; and the Cypher on the Right Hand being pointed off, for the Cypher annexed to the Dividend, there is left 69 *l.* for A's Share in the Gain. Then I multiply B's Stock, 320*l.* by the ſaid Quotient 3, and the Product is 960; then cutting off the Cypher, there remains 96*l.* for B's Share, *&c.* which are the ſame Anſwers as by the other Way.

The 2d *Example* work'd by this ſhorter Way.

A 750 }
B 460 } The Gain is 684 *l.*
C 500 }

1710)6840(4 the common Multiplier.
6840

(0)

750 A's Stock.
4

l. 300|0 A's Share of the Gain, —— —— *l.* 300

460 B's Stock.
4

l. 184|0 B's Share of the Gain, —— —— *l* 184

500 C's Stock.
4

l. 200|0 C's Share of the Gain, —— —— *l.* 200

Proof, *l.* 684

The third *Example* by the ſhorter Method ſtands thus:

	l.		*l.*		*s.*
	10 8	*i.e.*	10 Eight Tenths of a *l.*	or	16
	14 4		14 Four Tenths of a *l.*		8
	21 6		21 Six Tenths of a *l.*		12
	25 2		25 Two Tenths of a *l.*		4
Facit, l.	72 0		72		00

Example 4.

Divide *l.* 5760 10 among ſeveral Perſons, ſo that A may have $\frac{1}{2}$, B $\frac{1}{3}$, C $\frac{1}{4}$, D $\frac{1}{6}$, and E $\frac{1}{8}$, and tell me each Man's Part.

In this, and ſuch like Caſes take a Number out of which ſuch Parts may be taken; and take the like Parts of that Number, to find the Number you ſeek, *viz.* each Man's juſt Proportion, &c. *See the following Works and Anſwers.*

20 *s.* Then ſay, If 27 *s.* 6*d.*—5760*l.* 10*s.* what 10*s.* &c.

		Remainders				
$\frac{1}{2}$	10 0	18	2094	14	06	A
$\frac{1}{3}$	6 8	12	1396	09	08	B
$\frac{1}{4}$	5 0	9	1047	07	03	C
$\frac{1}{6}$	3 4	6	698	04	10	D
$\frac{1}{8}$	2 6	21	523	13	07	E
					2	
	27 6	33'0)66|0(2 *d.*	*Prin. l.* 5760	10	00	
	12					
	330					

Example 5.

In like Manner may be done that Queſtion ſo often critically propoſed, *viz.* of dividing 20 *s.* into $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$ Parts. *See the following Work.*

$\frac{1}{3}$
4

12 If 342 *d.* pay 20 *s.* what 120 *d.* *&c.*
5

60
6 If 342 pay 20, what 90, *&c.*

Common 360 Denominator

			s.	*d.*	*Parts.*
$\frac{1}{3}$	of 360	120	7	0—	72
$\frac{1}{4}$		90	5	3—	54
$\frac{1}{5}$		72	4	2—	180
$\frac{1}{6}$		60	3	6—	36

1*ſt Number* 342 20 0 342 makes 1 to carry, becauſe
in the Rule of 3 (*is* equal to the Diviſor 342.

Example 6.

Suppoſe a *Bankrupt*'s Money and Effects amount to 811 *l.* 10 *s.* and he owes to ſeveral Perſons as follows. *viz.*

			l.		
To	Mr. *Cruel*	— —	220	16	6
	Mr. *Gripe*	——	312	00	0
	Mr. *Hard*	— ——	117	12	6
	Mr. *Covet*	—— —	106	12	6
	Mr. *Near*	— ——	200	06	0
	Mr. *Squeeze*	— —	124	12	6
		l.	1082	00	0

How much muſt each Perſon have of the abovementioned 811 *l.* 10 *s.* in proportion to his Debt?

	l.	*l.*	*s*		*l.*	*s.*	*d.*
If	1082——	811	10,	what	220	16	6?
Anſw.	*l.* 165	12	4 $\frac{1}{2}$				

Or nearer, by ſeeing firſt what it comes to in the Pound, (as mentioned in Page 235) and then work each particular Sum by *Practice*. Thus, bring 811 *l.* 10 *s.* into Pence, and then divide them Pence by 1082, the Pounds that are owing, and the Quotient ſhews what it is in the Pound, *viz.* 15 Shillings. Then proceed for further Solution, thus:

What comes *l.* 220 16 6 to, at 15 *s. per* Pound?

s.		*l.* 220	16	6 at 15 *s. per l.*
10	$\frac{1}{2}$	110	8	3
5	$\frac{1}{2}$	55	4	1 $\frac{1}{2}$
Anſw.		165	12	4 $\frac{1}{2}$

And ſo of the reſt, ſee the following Anſwer. Or ſhorter, by taking $\frac{3}{4}$ of each Perſon's Debt, becauſe 15 *s.* is $\frac{3}{4}$ of a Pound.

Mr. *Cruel* muſt have *l.*	165	12	4 $\frac{1}{2}$
Mr. *Gripe* — —	234	00	0
Mr. *Hard* — ——	88	04	4 $\frac{1}{2}$
Mr. *Covet* —— —	79	19	5 $\frac{1}{2}$
Mr. *Near* — ——	150	04	6
Mr. *Squeeze* — —	93	09	4 $\frac{1}{2}$
Proof *l.*	811	10	0

With Time.

When this Rule hath any Relation to a particular Time, then you muſt multiply each Man's particular Stock of Money by the reſpective Time it continues in the joint Stock, and add all the Products together; which Total muſt be the firſt Number in the *Rule of Three*; the Gain or Loſs the ſecond, and each Man's Stock multiplied by his Time, the third; and then work as before, and as often repeat as there are Partners, *&c.*

Example 1.

A and B enter into *Company*, A puts into Stock 120*l.* for 7 Months; and B puts 230*l.* for 10 Months; and in Trading they gain 100*l.* what is each Man's Share, in Proportion to his Stock and Time? See the Work following.

120*l* A's Stock. 230 B's Stock.
7 Months A's Time. 10 Months B's Time.

840 A's Stock and Time. 2300 B's Stock and Time
2300

If 3140—gain 100*l.* what 840, A's Stock and Time.
Again,
If 3140 gain 100*l.* what 2300, B's Stock and Time.

					Parts.	
Anſwer,	*l.*	26	15	00 ¼	1660	A
		73	04	11 ½	1480	B

Proof *l.* 100 ———————— 3140*AFar.*

Or the Anſwers may be known by finding a common Multiplier, as directed in Page 235; or by finding the proportional Part of the Gain due to one Pound, as mentioned in the ſame Page.

Example 2.

Three Perſons enter into Partnerſhip, *viz.* A, B, and C, A puts into Stock 65*l.* for 8 Months, B 78*l.* for 12 Months, and C 84*l.* for 6 Months, and they gain 166*l.* 12*s.* what is each Man's Share, *&c.*

A's Stock multiplied by 8 produces, 520
B's Stock multiplied by 12 gives 936
C's Stock multiplied by 6 produces 504

1960 St. & Ti.

Then ſay,

S. and *T.* *l.* *s.* *l.* *S.* and *T.*
If 1960 gain 166 12 (or 166,6) what 620?
Anſw. 44 *l.* 4 *s.* (or 44,2) *&c.*

CHAP. XIV.

BARTER.

BARTER, or *TRUCK*, is no more than Exchanging one Commodity for another, and ſo to proportion their Rates, as that neither of the Parties may ſuſtain Loſs.

Example 1.

Suppoſe A has 144 Ells of Linen Cloth, worth 15 *d.* *per* Ell, which he would *truck* with B for Butter at 18 *s.* 9 *d.* *per* 100 ℔. how many Pounds of Butter muſt B give A for the Linen?

Anſwer, 960 Pounds.

The conciſeſt Way to Anſwer Queſtions in this Rule is firſt to find the Value of the firſt Goods mentioned, by the ſhorteſt Way of Practice; and then to Anſwer it by the *Rule of Three.*

15 *d.* is $\frac{1}{16}$ of a *l.* { 4) 144 Ells, at 15 *d.*
4) 36

l. 9 or 180 *s.*

Then ſay,

If 18 *s.* $\frac{3}{4}$ give 100 ℔. what 180 *s.* *&c.*
Anſwer, 960 ℔.

To prove the Work, caſt up the 960 ℔. at 2*d.* $\frac{1}{4}$ *per* ℔. (for ſo much it is *per* ℔. at 18*s.* 9*d. per* 100 ℔.) and if it amounts to 9*l.* the Value of the Linen, the Work is right. Thus:

2*d.* $\frac{1}{120}$ of a *l.*	960 at 2*d.* $\frac{1}{4}$ *per* ℔.
	8
$\frac{1}{4}$ is $\frac{1}{8}$ of 2*d.*	1
	l. 9 *Facit.*

Example 2.

A has Broad Cloths at 10*l.* 10*s. per* Piece, *B* hath Mace at 12*s. per* ℔. how many Pounds of Mace muſt *B* give *A* for 24 Broad Cloths? *Anſw.* 420 Pounds.

24
10,5

If 12*s.* —— 1 ℔. what 252 ℔. &*c.*

Example 3.

A hath 14 *C.* Weight of *Sugar,* at 6*d. per* ℔. for which *B* gave him 1 *C.* $\frac{3}{4}$ of Cinnamon, what was the Cinnamon rated at *per* ℔.

14
14
14
14

112 6*d.* $\frac{1}{40}$ of *l.* 156,8
84

If 196 Coſt *l.* 39,4 what 1 ℔. *Anſw.* 2, or 4*s.*

Examlpe

Example 4.

A and *B* barter, *A* hath 86 Gallons of *Brandy*, worth 9*s.* 2*d.* *per* Gallon ready Money, but in Barter he will have 11*s.* *per* Gallon; *B* hath Serge worth 2*s.* 1*d.* *per Yard*, ready Money, *Quere*, How many Yards of Serge muſt *B* give *A* for 86 Gallons of Brandy?

The Rule. Firſt find what Advance *B* ought to make *per* Yard for his Serge, in Proportion to what *A* hath done upon a Gallon of his Brandy. Thus:

If 9*s.* 2*d.* increaſe to 11*s.* what muſt 2*s.* 1*d.* increaſe to? Anſwer, 2*s.* 6*d.*

Then ſee by Practice what *A*'s Brandy comes to at 11*s.* *per* Gallon, which will be found to amount to 47*l.* 6*s.* then ſay by the *Rule of Three.*

	s.	*d.*		*Yard.*			*l.*	*s.*	
If	2	6	buy	1	what	will	47	6	buy?

Anſwer, 378 Yards $\frac{2}{5}$

And ſo of any other *Example* in this Rule of this Kind.

CHAP. XV.

INTEREST,

IS an Allowance of the *Borrower* to the *Lender* in conſideration of the uſe made of the *Lender*'s Money; and therefore Intereſt ſometimes is called *Uſe Money*, and this *Intereſt* is either *Simple* or *Compound*. *Simple Intereſt* is that which cometh of the Principal only, and *Compound Intereſt* is that which ariſeth from *Principal* and

Intereſt alſo, and is therefore called *Intereſt upon Intereſt*; but, this latter being accounted very unlawful, is ſeldom allowed, but in ſome particular Agreements, *&c.* I ſhall therefore not inſiſt upon it; but as to the former, to wit, *Simple Intereſt*, I ſhall endeavour at ſome practical Rules and Methods to render it eaſy to the meaneſt Capacity; and ſhew alſo, that by the Methods of working Intereſt, ſeveral other uſeful things are anſwered, that do not come under that Denomination.

Example 1.

What comes the Intereſt of a Bond of *l.* 374 12 9 to, at 6 *l. per Cent.* for a Year?

Rule. Multiply the principal Money, by the Rate of *Intereſt*, be it what it will, and divide by 100. State it thus:

$$\begin{array}{lclclrrr}
 & l\ P & & l\ I & & l\ P & s & d\\
\text{If} & 100 & \text{gain} & 6; & \text{what} & 374 & 12 & 9\\
 & & & & & & & 6\\ \cline{6-8}
 & & & & & 22|47 & 16 & 6\\
 & & & & & & 20 & \\ \cline{7-8}
\end{array}$$

$$\left.\begin{array}{r}
9|56\\
12\\ \hline
6|78\\
4\\ \hline
3|12
\end{array}\right\}
\begin{array}{cccc}
l & s & d & \\
22 & 9 & 6\frac{3}{4} & \frac{12}{100}
\end{array}$$

Here I multiply the third Number by the ſecond, according to *Multiplication of Money*, and the Product is *l.* 2247-16-6, which I divide by 100, by cutting off two Figures with a Daſh of the Pen, which is dividing by 100, according to the 6th *Rule* of the 5th Chapter, then I multiply the ſeveral Remainders by 20, by 12, and by 4, and ſtill divide by 100, as before, and the Anſwer is *l.* 22-9-6 $\frac{3}{4}$ $\frac{12}{100}$, as may be ſeen by the Work above.

And the Truth may be proved by ſtating and working it back again thus:

```
    l. P. s. d.        l. P. s. d.                l. P.
If  374   12  9  gain  22   9  6 3/4 12/100, what 100?
```

Example 2.

What's the *Intereſt* of *l.* 826 13 9 for a Year, at 5 *per Cent.*

```
                        826  13  9
                                  5
                        ----------
                        41|33   8  9
                            20  ⎫
                        ----    ⎪
                           6|68 ⎪
                            12  ⎪
                        ----    ⎬ l. 41  6  8 1/4
                           8|25 ⎪
                              4 ⎪
                        ----    ⎪
                           1|00 ⎭
```

Shorter thus:

```
1/20| 82|6  13  9
---------------------
facit l. 41  6  8 1/4
```

In the ſhorter Method, I conſider that the Rate of *Intereſt*, *viz.* 5 *per Cent.* is the 20th part of 100 *l.* wherefore I take that part of the principal Money, which is done by halving it, thus: The $\frac{1}{2}$ of 8 is 4, and the $\frac{1}{2}$ of 2 is 1, or 41 *l.* and the 6 cut off is (for the Cypher in $\frac{1}{20}$ 6 *s.* and the 13 *s.* 9 *d.* reduced into Pence, by your Head or Pen, makes 165, and ſuppoſing the 5 cut off, the $\frac{1}{2}$ of 16 is 8 Pence; and 5 reduced into Farthings make 20, and ſuppoſing the 0 to be cut off from that likewiſe, the $\frac{1}{2}$ of 2 is $\frac{1}{4}$, and ſo the Anſwer is the ſame with the other, *viz.* *l.* 41-6-8 $\frac{1}{4}$, and the moſt conciſe Method that can be.

Example 3.

What's the *Simple Intereſt* of
l. 34|8 13 2 at 6 *per Cent?*

17 08 $7\frac{3}{4}$ } $\frac{1}{20}$ for 5 *per Cent.*
3 09 $8\frac{3}{4}$ } $\frac{1}{5}$ for 1 *per Cent.*

Facit, *l.* 20 18 $4\frac{1}{2}$

Example 4.

What's the Intereſt of *l.* 746-12-6 at $5\frac{1}{2}$ *p. C.*
5

3733-02-6
The $\frac{1}{2}$ of 746 *l.* &c. 373-06-3

41|06-08-9
20
1|28
12
3|45
4
1|80
} *l.* 41-1-3 $\frac{1}{4}$

Sooner thus:
74|6 12 6

$\frac{1}{20}$ | 37 06 $7\frac{1}{2}$
$\frac{1}{10}$ | 3 14 $7\frac{3}{4}$

l. 41 01 $3\frac{1}{4}$ *facit.*

Thus by either of theſe Ways may the Intereſt of any Sum of Money, for a Year, be found, at any Rate *per Cent.* Likewiſe by the ſame Method of Working, may the Proviſion, Commiſſion, or Factorage of any Sum be known: As alſo Inſurance, Avarage, Storage, Brokerage, or any thing elſe, rated at ſo much *per Cent.*

What is the Factorage of Goods bought, or otherwiſe negotiated, to the Value of *l.* 479 16 9 at 2 *p. Cent.*

479 16 9
9|59 13 6
20
11|93
12
11|22 Anſw. 9-11-11.

Or thus:
2 *p. C.* $\frac{1}{50}$ | 479 16 9
Facit, l. 9 11 11

What is the Inſurance of 230 *l.* at 10 $\frac{3}{4}$ *per Cent.*

l. 2300——10 *per Cent.*
115
57 10
24|72 10
20
14|50
12
6|00
l. 24 14 6

Or thus:
10 *per Cent. l.* 23|0
| 10s | $\frac{1}{20}$ | 1 3
| 5s | $\frac{1}{2}$ | 11 6
l. 24 14 6

This Method may be of good Uſe for taking off 5 *per C.* for prompt Payment in *Cuſtom-Houſe* Duties, and 15 *per Ct.* the *additional* duty on *French* and *Eaſt-India* Goods.

Admit I were to take off 5 *p. Ct.* from *l.* 275 12
Subtract $\frac{1}{20}$ 13 15 07
Anſwer, *l.* 261 16 05

Again, take off 15 *per Cent.* from *l.* 672 16 08
$\frac{1}{10}$ 67 05 08
$\frac{1}{2}$ 33 12 10
Subtract 100 18 06
Anſwer, *l.* 571 18 02

Once more, take 25 *p. Ct.* from *l.* 321 12 4

5 *per Ct.* $\frac{1}{20}$ 16 01 7 $\frac{1}{4}$
5

Deduct 80 08 0 $\frac{1}{4}$ 25 *p. Ct.*

Anſwer, *l.* 241 04 3 $\frac{3}{4}$

Example 5.

What comes the Intereſt of *l.* 446 12 to, for 9 Months, at 6 *per Cent. per Annum?*

Here I take the $\frac{1}{2}$ of the Year's Intereſt for 6 Months, and then the $\frac{1}{2}$ of that for 3 Months, and add them together for 9 Months, as in the following Work.

l. 446 12
6 *per Cent.*

26|79 12
20

15|92
12

11|04

l. 26 15 11 $\frac{4}{100}$ for a Year.

6 *Mo.* 13 07 11 $\frac{1}{2}$ for $\frac{1}{2}$ a Year.
3 *Mo.* 6 13 11 $\frac{3}{4}$ for $\frac{1}{4}$ *ditto.*

l. 20 01 11 $\frac{1}{4}$ for 9 Months.

Example 6.

To what comes the Intereſt of *l.* 297-12 at 5 *per Cent.* for 6 Months? *Anſwer l.* 7-8-9 $\frac{1}{2}$

l. 14 17 7 for a Year.

Take $\frac{1}{2}$ for 6 Months } *l.* 7 08 9 $\frac{1}{2}$ Anſwer

When at any time the Rate of Intereſt hath $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ annexed, you muſt firſt multiply by the whole Number, and then take $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ of the principal Money, (as is taught in the 13th Rule of the 4th *Chapter)* and add the two Lines together, and then divide by 100, as before.

Example 7.

What is the Intereſt of *l.* 376 12 6
at 4 $\frac{1}{2}$ *per Cent?* 4

1506 10 0
For the $\frac{1}{2}$ *per Cent.* take half of the Principal 188 06 3

16|94 16 3
20
18|96
12
11|55
4
2|20

Anſwer *l.* 16-18-11 $\frac{1}{2}$

Example 8.

What is the Intereſt of *l.* 226 10
at 3 $\frac{3}{4}$ *per Cent?* 3 $\frac{3}{4}$

p. Pe. 679 10 0
$\frac{1}{2}$ | $\frac{1}{2}$ | 113 05 0
$\frac{1}{4}$ | $\frac{1}{2}$ | 56 12 6

8|49 07 6
20
9|87
12
10|50
4
2|00

Anſwer *l.* 8-9-10 $\frac{1}{2}$

Another Way, (when the Time is odd or not juſt a Year) is to multiply the Principal by the Intereſt of 100 *l.* for the nominated Time, cutting off two Figures to the Right Hand; as before.

Example 1.

What's the Intereſt of *l.* 234 12 6 for 2 Years at 5 *per Cent.*

The Int. of 2 Yrs. at 5 *p. Ct.* } 10 *l.*

23|46 05 0
20
9|25
12
3|00

} *l.* 23 9 3.

Example 2.

What's the Intereſt of *l.* 312 16 for 5 Years, at 6 *per Cent.*?

5 and 6

1564 0
6

93|84 0
20
16|80
12
9|60
4
2|40

Anſw. *l.* 93 16 9 ½

Here the Intereſt of 100 *l.* for the Time, is 30 *l.* therefore I multiply by the Ratio's of 30, *viz.* 5 and 6; as in the Example.

Example

Example 3.

What's the Intereſt of *l.* 428 14 for 9 Mon. at 4 *per* C.

$$\left.\begin{array}{l}\text{The Inter. of } 100\,l.\\ \text{for 9 Mon. at } 4\ p.\ C.\end{array}\right\}\text{ is } \quad 3\,l.$$

$$\begin{array}{r}12|86 \quad 2\\ \left.\begin{array}{r}20\\ \hline 17|22\\ 12\\ \hline 2|64\\ 4\\ \hline 2|56\end{array}\right\} l.\ 12\ \ 17\ \ 2\ \tfrac{1}{2}\end{array}$$

$$\text{When the Rate is at}\left\{\begin{array}{c}5\\6\\4\\3\end{array}\right\} p.\ C.\ \text{for}\left\{\begin{array}{c}12\\10\\15\\20\end{array}\right\}\text{Months}$$

Then the Intereſt of any Principal, is juſt ſo many Shillings as there are Pounds; therefore only take $\frac{1}{20}$ of the Principal, &c.

Example 1.

What's the Intereſt of——*l.* 412 06 9 at
5 *per Cent.* for 12 Months?

$\frac{1}{20}$ 20 12 4 Anſw.

Example 2.

What's the Intereſt of——*l.* 324 12 0 at
6 *per Cent.* for 10 Months?

$\frac{1}{20}$ 16 04 7 $\frac{4}{20}$ Anſw.

Example 3.

What's the Intereſt of ——— *l.* 428 16 4 at
4 *per Cent.* for 15 Months?
$\frac{1}{20}$ 21 08 9 $\frac{3}{4}$ Anſw.

Hence it neceſſarily follows, that the Intereſt of any given Principal may be found, by taking Parts for the Time propoſed, out of the Time mentioned in the foregoing Table; thus: If the Intereſt of *l.* 412 6 9 for 12 Months, be *l.* 20-12-4, as above, at 12 *d.* in the Pound, then for 6 Months it muſt be $\frac{1}{2}$, *viz.* *l.* 10-6-2; and for 3 Months $\frac{1}{4}$.

Examples.

What's the Intereſt of ——20)276 05 9 for 4 Mon.
at 5 *per Cent.*
13 16 3 $\frac{1}{4}$
4 Mon. $\frac{1}{3}$ of 12 Mon. | *l.* 4 12 1 Anſ. for 4 m.

Again, what's the Intereſt of 20)157 09 0 for 5
Months, at 6 *per Cent.*
7 17 5 $\frac{1}{4}$
5 Mon. $\frac{1}{2}$ of 10 Mon. | *l.* 3 18 8 $\frac{1}{2}$ Anſ.

And ſo for 4 or 3 *per Cent.* for 15 or 20 Months, in the ſame Manner.

When the *principal Money* is any Number of *Pounds*, without *Shillings* or *Pence*, then it may be done by the following Method of working.

Example

Example 1.

What's the Intereſt of 40 *l.* for 7 Years, 5 Months, and 26 Days, at 6 *per Cent. per Annum?*

Years. *Mon.* *Days.*
7 5 26
12 Months in a Year.
———
89
30 Days in a Month.
———
2696
40 Principal Money.
———
1|00)1078|40
Groats 6|0)107|8
in all. ———
l. 17 58 *Groats*, or 19 *s.* 4 *d.* and 1 *d.* ½ for the (*Fraction.*

Here the Time is ſet down, and multiplied by 12, the Calendar Months in a Year, and the odd Months taken in, and then by 30, the ſuppoſed Days in a Month, and the odd Days taken in likewiſe, which Product of Days is multiplied by the principal Money, *viz.* 40 *l.* which Product is divided by 100, and then that Quotient by 60, the *Groats* in a Pound, and the Remainder is *Groats*, *viz*, 58, which is 19 *s.* 4 *d.* and 1 *d.* ½ for the Fraction, in all *l.* 17-19-5 ½: As in the Work.

Example 2.

What is the Intereſt of 590 *l.* for 3 Years, 7 Months, and 19 Days at 6 *per Cent. per Annum?*

Years. *Mon.* *Days.*
3 7 19
12 Months in a Year.

43
30 Days in a Month.

1309
590 Principal Money

117810
6545

1|00)7723|10

6|0)772|3

Anſw. l. 128-43 Groats, or 14*s.* 4*d.* In all, *l.* 128-14-4

There is alſo another Way of calculating *Intereſt*, by Days, which is thus: Bring the *Principal Money* into *Pence*, then multiply them Pence by the Days it is out at Intereſt, and if the Rate be 6 *per Cent.* then divide by 6083, which is what is produced by the Days of a Year multiplied by 100, and divided by the Rate of Intereſt; but if the Rate be 5 *per Cent.* then divide by 7300.

Example.

What is the Intereſt of 150 *l.* for 10 Months and 24 Days, at 5 *per Cent. per Annum*?

l. 150

```
                                        Mo. Days.
   l. 150                               10   24
       20                               30
   ------                              ----
     3000                               324
       12
   ------                               12)
    36000       73|00)116640'00(1597
      324 Days at Intereſt.            ----
   -------                              13|3  1
   144000                              ------
    72000                        Anſw. l. 6-13-1
  108000
  --------
  11664000
```

Another Rule by Days.

Multiply theſe three Numbers continually, *viz.* the given Intereſt of 100 *l.* for a Year; the Principal whoſe Intereſt is required; and laſtly, the Number of Days, required; and the laſt Product is to be reſerved for a Dividend. Then multiply 365 Days by 100, (which is only annexing two Cyphers) and let that Product be your Diviſor; (which ſerves for all Rates) and then divide as uſual, and the Quotient will be the Intereſt ſought.

Note here, That the two Principals, *viz.* 100 *l.* and the other propoſed, are ſuppoſed to be of one Denomination; alſo the Intereſt required will be of the ſame Name with the given Intereſt of 400 *l.*

Example.

What's the Intereſt of 400 *l.* for a Week, or 7 Days, at 6 *per Cent. per Annum?*

```
                        400
                          6
                     ------
  365                  2400
  100                     7
-------              ------
36500 Diviſor        )16800( Dividend.

                              Anſ.
           36500)16800,000(,4602 or 9 s. 2 d. ¼
```

Here, in valuing, the Farthings are always leſſened by one.

When the Rate is 5 *s. per Cent.* take the ¼ of the Principal, and work as before.

What is the *Brokerage* of *l.* 465 12 6 at 10 *s. per Cent.*

```
                          l. 465   12   6
                          ----------------
                        ½ 2|32    16   3
                         ⎧  20
                         ⎪ ----
                         ⎪ 6|56
                         ⎪  .12
   Anſw. l. 2-6-6 ¾      ⎨ ----
                         ⎪ 6|75
                         ⎪    4
                         ⎪ ----
                         ⎩ 3|00
```

If you would know what any Sum comes to, at 30, 40 or 50 *per Cent.* firſt ſee what it comes to at 10 *per Cent.* and then multiply that Anſwer by 3, 4 or 5, *&c.*

Example.

What comes *l.* 726 10 6 to, at 40 *per* (*Cent.*
10

72|65 05 0
l. 72-13-0 ½ 10 *per Ct.* 20
4
13|05
l. 290-12-2 Anſwer. 12
60
4
2|40

* * *

CHAP. XVI.

DISCOUNT,

IS when a Sum of Money hereafter due, is ſatisfied by paying down ſo much preſent Money, which if put to Intereſt, at ſuch a Rate, and for ſuch a Time, would encreaſe itſelf to the Sum firſt due.

Example 1. What is the *Diſcount* of *l.* 487-12 for ſix Months, at 6 *per Cent. per Annum?*

To anſwer this, and other Sums of the ſame kind, the general Rule is, to make 12 Months the firſt Number in the *Rule of Three*, the Rate of *Intereſt* the ſecond, and the diſcounted Time the third.

If 12 Months give 6 *l.* what 6 Months?
6

12)36

3 To be added to 100 *l.* the firſt

Number in the next Work. Then ſay again, if 103 *l.* abate 3 *l.* what *l.* 487-12. Anſwer *l.* 14-4 *Diſcount.* *See the following Proof.*

After I find the Diſcount to be *l.* 14-4, I deduct it from the Sum firſt due, *viz. l.* 487-12, and the Remainder is the preſent Money to be paid down: And for the Proof of the Aſſertion in the firſt Rule, I take the Sum to be paid down, and calculate it at 6 *per Cent.* the Rate of Intereſt propos'd, and the Anſwer is *l.* 28-8, the Intereſt for a Year; the ½ of which for ſix Months, (the Time diſcounted) is *l.* 14-4, the *diſcounted Sum:* As by the following Work.

l. 487 12 firſt due.
14 04 diſcounted.

473 08 to pay down.
6 *per Cent.*

28|40 8
20

8|08
Int. for a Y. l. 28-8

½ for 6 *Mo. l.* 14-4 Proof.

From whence it is manifeſt, no one allows Intereſt for any more Money than he receives.

Ex. What is the Diſcount of 275 *l.* 10 *s.* for 7 Months, at 5 *per Cent. per Annum.*

		5 *l. per Cent.*
6 Mo.	½	2 10
1 Mo.	⅙	0 8 4
		l. 2 18 4

If *l.* 102-18-4 abate *l.* 2-18-4, what *l.* 275-10?
Anſw. *l.* 7-16-1.

First due, *l.* 275-10
Diſcounted, 7-16-1

Paid down, 267-13-11
5*p.C.*

13|38-09-07
20

7|69
12

8|35
4

1|40

l. s. d.
Intereſt 13 7 8 ¼

6 Mo. ½ 6-13-10
1 Mo. ⅙ 1-02-03

Proof, 7-16-01

Example 3.

Bought Goods to the Value of *l.* 109-10, on 9 Months Diſcount, at 6 *per Cent. per Annum*, what muſt be paid down?

6 *l. per Cent.*
6 Mo. ½ 3 00
3 Mo. ¼ 1 10

4 10
100

If *l.* 104 10 abate *l.* 4 10, what 109 10?
Anſ. 4 14 3 4 14 3

Anſwer, to be paid down *l.* 104 15 9

Example 4.

Sold Goods amounting to *l.* 217-12, on two 3 Months Diſcount, (that is, half at 3 Months, and the other half 3 Months after that) at 5 *per Cent. per Annum,* what muſt be paid down?

5 *l. per Cent.*
If *l.* 101-05 abate *l.* 1-5, wt. 108-16
3 M. $\frac{1}{4}$ 1 5 *Anſ. l.* 1-06-10 Diſc.
100 0 *l.* 217 12
101 5 108-16 } 2 Parts.

Again.

If *l.* 102-10 diſ. *l.* 2-10, what *l.* 108-16
Anſ. l. 2-13-0 Diſc.

217-12 val. ſold
5 *per Cent.*
l. 108-16 for 3 *m.* 1-06-10 Diſc.
6 M. $\frac{1}{2}$ 2 10 108-16 for 6 *m.* 2-13-00 Diſc.
100 00
Total Diſcount, 3-19-10
102 10
Paid down, *l.* 213-12-02 *Anſ.*

In the foregoing Example, I firſt divide the given Sum into two equal Parts, by taking the half of it; then for 3 Months I take $\frac{1}{4}$ Part of the Rate, *viz.* 5 *per Cent.* and it makes *l.* 1-5. Then I add that *Facit,* to 100 *l.* and make the firſt *Stating,* ſaying, if *l.* 101-5 Diſcount *l.* 1-5, what *l.* 108-16? and the Anſwer is *l.* 1-6-10, for the firſt 3 Months Diſcount. Then for 6 Months I take the $\frac{1}{2}$ of the Rate, and it makes *l.* 2 10: Then I ſay again, if *l.* 102-10 abate *l.* 2-10, what *l.* 108-16? and the Anſwer is *l.* 2-13 for 6 Months Diſcount. Then I add the two Diſcounts together, and ſubtract the Total from the *Sum* firſt due, and the Remainder is *l.* 213-12-2 to be paid down preſently. Which may be ſeen by the Work.

When the Payments are to be made at three ſeveral Times, then divide the given *Sum* into three equal Parts, and work as before; and if at 4 Payments, then divide the Sum into 4 equal Parts, *&c.*

There is another and better way, when the Rate is at 6 *per Cent.* Diſcount, which is this:

Bring the given Sum into Pence, and then multiply thoſe by the Time, which Product divide by 200, and the Time added together, and the Quotient will be the Anſwer in Pence, which reduce into Pounds, &c.

Example 5.

For Trial, let us take the firſt Example in this Rule, *viz.*

What is the Diſcount of *l.* 487 12
for 6 Months, at 6 *per Cent.*

l. 487 12
20
9752
12
117024 Pence.
6 Months Time
206)702144(3408 Pence
618
841
824
1744
1648
(96)

200
6
Diviſor, 206

12)3408 Pence
28|4
Diſcount *l.* 14-4

l. 487 12 Firſt due
14 04
Anſw. *l.* 473 08 to pay down

A third Way of Diſcount is to multiply 12 Months by 100, (which is only annexing two Cyphers to 12) and divide the Quotient by the Rate of Diſcount, and to that Quotient add the Time propoſed; which Sum reſerve for a Diviſor: Then multiply the Sum to be diſcounted by the propoſed Time, and divide that Product by the above mentioned Diviſor.

Example 6.

What's the Diſcount of *l.* 487-12, for 6 Months, at 6 *per Cent. per Annum*, (the firſt Example in this Rule)?

12
100
Rate ——
6)1200
200
Time added 6
Diviſor, 206

Sum to be Diſcounted, { *l.* 487 12 / 6 Months
206)2925 12(14 *l.*
206
865
824
41
20
832(4 *s.*
824
(8)

Anſ. *l.* 14-4 to be diſc.

Example 7.

What preſent Money will diſcharge a Debt of 122*l.* 11 *s.* 4 *d.* due at 3 Months, diſcounting after the Rate of 6 *per Cent. per Annum?* Anſwer, *l.* 120-15-1 ½

After the laſt Method of Operation.

	l.	*s.*		*l.*	*s.*	*d.*	
Diviſor, 203)	367	14	(	1	16	2 ½	Diſcount.

&c.

Example

Example 8.

What's the Diſcount of *l.* 275-10, for 7 Months, at 5 *per Cent. per Annum?* *Anſw. l.* 7-16-1 $\frac{3}{4}$.

As before.

```
                  l.   s.   l.  s. d.
Diviſor, 247) 1928  10  (7  16  1 3/4 Diſcount.
                     &c.
```

For	Rate		Divisor	
For	2	*per Cent.* Diſcount.	600	with the Time added, is the Diviſor.
	3		400	
	4		300	
	5		240	
	6		200	
	7		171	
	8		150	
	9		133	
	10		120	

When the Diſcount of any Sum is at any of the Rates in the Table above, *viz.* from 2 to 10, then the oppoſite Numbers with the Time of Diſcount added to them, will be proper Diviſors for your intended Purpoſe, and are found by dividing 1200 by the Rate of Diſcount; according to the Rule of the third Method of Diſcount.

If the Diſcount be 20, 30, or 40 *per Cent.* then cut off a Cypher from 600, 400, 300, &c. and add the Time to 60, 30, or 40, for the Diviſor, &c.

Example 9.

What is the Diſcount of *l.* 212-15, for 3 Months, at 40 *per Cent. per Annum?*

According to Rule, I add 3 (the Time) to 30, and it makes 33 for a Diviſor, &c.

```
     212  15
           3
   ----------
33)638  05(l. 19-6-9 3/4 3/11 Anſwer.
  &c.
```

CHAP. XVII.

EXCHANGE,

IS the receiving of Money in one Country, or Nation, and paying it again in another, Value for Value, having reſpect to the ſeveral Species of Coin, or Money of each Nation.

Exchange of Coins, is like the Buſineſs of exchanging or Bartering of Goods, and depends on a clear Underſtanding of the *Golden Rule*, to find what Sum of one Country's Money will be equal in Value to any propoſed Sum of another Country's Money: In order to which, it is very neceſſary to have at all times a true Account of the juſt Values of thoſe Foreign Coins that are to be exchanged, as they are compar'd in Value to our *Engliſh*, at all times, as aboveſaid, becauſe the *Par* of Exchange differs almoſt every Day from *London* to other Countries, that is, it riſes and falls, *&c.*

The Way of Working *Exchange* is, either by the *Rule of Three* or by *Practice*, and moſt commonly by the latter.

London Exchanges with *Holland*, *Flanders*, *&c.* upon ſo many Shillings, and Pence *Flemiſh* for the Pound Sterling; the *Par* being 33 *s.* 4 *d.* *Flem.*

Dutch Money.	Sterl. Val.	
2 Groats, 1 *Stiver*	*s.*	*d.*
1 *Stiver*	0	$1\frac{1}{5}$
6 *Stivers*, 1 Schilling *Flem.*	0	$7\frac{1}{5}$
20 *Stiver*, 1 *Guilder*	2	0
6 *Guilders*, 1 Pound *Flem.* 20 *s.*	12	0
33 *s.* 4 *d.* *Flemiſh*, or 10 *Guilders*	20	0
A common *Dollar*	3	0
A Specie *Dollar*	5	0

Example

Example 1.

Remitted from *London* to *Amſterdam*, a Bill of *Exchange* of *l.* 285-10 *Sterling*, the Exchange of 33 *s.* 9 *d. Flem. per Pound Sterl.* how many *Guilders Flemiſh* muſt the Bill be drawn for? Anſ. 2890 *Guilders* 13 *Stivers*. Work'd thus:

```
If 20s. give 33 s. 9 d. Flem. what l. 285  10 Sterl.?
                12                     20
             ------                 ------
               405                    5710
                                       405
                                   -------
                                     28550
                                    228400
                                  ---------
                               2|0)231255|0
                                  ---------
      2 Groats 1 Stiver         2)115627-10
                                  ---------
      20 Stivers, 1 Guilder     2|0)5781|3
                                  ---------
                          Anſwer, 2890 13
```

When you would know your Gain, or how much the Exchange is in your Favour, ſubtract the *Par* from the Courſe, or Price of the Exchange, and the Difference is the Gain *per Pound Flemiſh*, as here it is but 5 *d.* And ſo the contrary for Loſs, &c.

Example 2.

A Merchant in *Rotterdam* remits a Bill of *Exchange* of 7621 *Guilders*, 7 *Stivers*, to be paid in *London*, how much Sterling Money muſt the ſaid Bill be drawn for, the Exchange at 33 *s.* 4 *d. Flem. per Pound* Sterling?
Anſw. *l.* 762-2-8.

If 33 *s.*

		Guild. *Stiv.*
If 33 *s.* 4 *d. Flem.* gives	20 *s. Sterl.* what	7621 7
12	12	20
400	240	152427
		2 *Groats*
		304854
		240
		12194160
		609708
		4|00)731649|60
		12)182912
		2|0)1524|2-8
		Anſw. l. 762-02-8

Sterling Money may be brought into *Flemiſh Money* by *Practice*, thus: Conſider how much the Rate of Exchange is above a Pound *Sterling*, which reduce to the Parts of a Pound, and take thoſe Parts of the *Sterling Money*, and add them to the *Sterling Money*; which Total multiply by 6, becauſe 6 *Guilders* make a Pound *Flemiſh*, and the Product will be the Anſwer.

Example.

The Anſwer to the 2d *Example* of *Flemiſh* Money, reduced to *Sterling* Money, is *l.* 762 2 08

Here the Difference is 13 *s.* 4 *d.* or $\frac{2}{3}$ of a *l.* wherefore I take $\frac{2}{3}$ of *l.* 762-2-8, and add the Reſults to it, and it makes 7621 *Guilders* 6 *Stivers*, 8 *Pennicks*, or 1 *Groat*; as by the *Rule of Three.*

l. 762	2	08	
254	0	10	$\frac{2}{3}$
254	0	10	$\frac{2}{3}$
1270	4	05	$\frac{1}{3}$
		6	
Guild. 7621	6	08	

Or *Flemiſh* Money may be brought into *Sterling* Money, by bringing the Courſe or Rate of Exchange into Pence, for a Diviſor; and the *Flemiſh* Money into Pence likewiſe, for a Dividend; and the Quotient will be the Anſwer, in *Sterling* Money.

Example 3.

For how much *Sterling* Money muſt a Bill be drawn, for Goods bought in *Holland*, amounting to 11715 *Guild.* 12 *Stivers*, the Exchange at 34 *s.* 8 *d. Flem. per* Pound *Sterling*.

s. *d.* *Guild.*
34 8 11715 12 *Stiv.*
12 40 Groats.

416 Diviſ.)468624(*l.* 1126 10 *Sterl.*
(208) Remainder.
20

4160(10 *s.*
4160

London Exchanges with *France* upon the *French* Crown, whoſe *Par* is 54 *d.* that is, to pay ſo many *Pence*, or *Shillings* and *Pence*, for the *French* Crown.

French Money.	Val. Sterl.	
	s.	*d.*
12 *Deniers* 1 *Soulz*	0	0 $\frac{3}{4}$, $\frac{1}{5}$
20 *Soulz* 1 *Livre*	1	6
3 *Livres* 1 *Crown*	4	6

Example 4.

If I draw a Bill *per* Exchange *l.* 210 17 10 *Sterling*, to be paid in *Paris*, the Exchange at 57 *d.* $\frac{1}{8}$, for how many Crowns muſt I draw the Bill.

Anſw. 886 *Fr. Cr.* 0 *Liv.* 1 *Soulz.*

	d.	*Fr.Cr.*		*l.*	*s.*	*d.*
If	$57\frac{1}{8}$ ——	1 ——	what	210	17	10
	8	3 *Liv.*		20		
	——	——		——		
	457	3 *Liv.*		4217		
		20 *Sol.*		12		
		——		——		
		60		50614		
				8 Eights		
				——		
				404912		
				60 Second Number.		

457)24294720(53161 *Soulz*

1 *Fr.Crown* 60 *Soulz* 6|0)5316|1

Li. Soulz

F. Cr. 886 00 1 *Anſwer.*

Example 5.

Admit a Bill drawn in *Lyons*, and payable in *London* for 1510 Crowns, 2 *Livres* 10 *Soulz*, how much *Engliſh* Money comes it to, the Exchange at 55 *d.* $\frac{1}{8}$?

Anſw. l. 347-0-4 $\frac{5}{8}$.

Again, ſuppoſe a Merchant in *London* buys Goods for another in *Calais*, to the Value of *l.* 102 4 *Sterling*, for which he is to draw a Bill on him in *Calais*; for how many Crowns muſt the Bill be drawn, Exchange at 56 *d. per* Crown? *Anſw.* 438 *Fr. Cr.*

	s.	*Fr.Cr.*	*l.*	*s.*
If	$4\frac{2}{3}$ ——	1 ——	102	4
	3		20	
	——		——	
	14		2044	
			3	
			——	
			7)6132	
			——	
			2) 876	
			——	

Here the firſt and third Numbers are brought into Thirds, and then I divide by 7 and 2, the *Ratio*'s of 14, &c.

Anſw. 438 Crowns.

London exchanges with *Spain* upon the Pieces $\frac{8}{8}$, at 54 *d. Sterling.*

Spaniſh Money.	Sterl. Val.	
1 *Mervid*	*s.* 0	0 $\frac{1}{3}$, $\frac{1}{37}$
34 *Mervids* 1 *Rial* (formerly 6*d.*)	0	4 $\frac{3}{4}$
11 *Rials Plate* 1 *Ducat*	4	4
10 *Rials Plate* 1 *Pcs.* $\frac{8}{8}$	4	0

Example 6. How many *Pcs.* $\frac{8}{8}$ at 48 *d.* $\frac{1}{4}$, will anſwer a Bill of *l.* 344 11 8 $\frac{1}{2}$ *Sterling?* *Anſw.* 1714.

Example 7. 24690 *Rials* Plate, how many *Pcs.* $\frac{8}{8}$, and Pounds *Sterling*, the *Exchange* at 4 *s.* 6 *d. per Pcs.* $\frac{8}{8}$?

Anſwer, { 2469 *Pcs.* $\frac{8}{8}$
l. 555 10 6 *Sterling.*

London Exchanges with *Portugal* upon the *Millrea,* of about 5 *s.* 6 *d.* to 5 *s.* 7 *d.*

Portugal Money.	Sterl. Val. *s.*	*d.*
12 $\frac{1}{2}$ *Reas*	0	1
1000 *Reas* 1 *Millrea*	6	8
1 *Feſtoon*	1	3

Example 8. How many *Millreas,* muſt a Bill be drawn for, to pay *l.* 125 11 11 $\frac{3}{4}$ *Ster.* the Exchange at 5 *s.* 6 *d.* $\frac{1}{4}$ *per Millrea?* *Anſw.* 455 *Millreas.*

If 5 *s.* 6 *d.* $\frac{1}{4}$ —— 1 what *l.* 125 11 11 $\frac{3}{4}$?
Anſw. 455.

Example 9. How many Pounds *Sterling,* &*c.* muſt a Bill be drawn for, to anſwer 500 *Millreas,* the Exchange at 5 *s.* 5 *d.* $\frac{5}{8}$ *per Millrea?* *Anſw.* 136 14 4 $\frac{1}{2}$

Example 10. How many Pounds *Sterling,* &*c.* muſt a Bill be drawn for, to anſwer 600 *Millreas,* 550 *Reas,* at 5 *s.* 7 *d. per Millrea?* *Anſw. l.* 167-13 0 $\frac{37}{45}$

London Exchanges with *Venice* upon the *Ducat* of 52*d.* and with *Legborn* upon the *Dollar*, or *Pcs.* of $\frac{8}{8}$ of 54*d.*

Italian Money.	Sterl.	Val.
1 *Livre* at *Legborn*	*s.* 0	9
1 *Crown* current at *Florence*	*s.* 5	3
1 *Ducat de Banco* at *Venice*	4	4
1 St. *Mark* at ditto	2	10
1 *Palermo* Florin	2	6

When a Compariſon is made between *Foreign Coins* of one Country and another, ſuch Queſtions may be anſwered by the *Single Rule of Three Inverſe.*

Example 11.

How many *Spaniſh Ducats*, at 4*s.* 4*d.* muſt be drawn for 700 *Rix Dollars*, at 5*s.* 6*d.*

If 700——5*s.* 6*d.*——4*s.* 4*d*?

12 12

66 52

700

$52)46200(888\frac{24}{52}$ Anſw.

416

460

416

440

416

(24)

CHAP.

* * *

CHAP. XVIII.

PROFIT and *LOSS*.

Example 1.

IF I buy 220 Yards of *Broad Cloth*, at 8 *s.* 6 *d. per Yard*, and ſell it again at 10 *s.* 4 *d. per* Yard, what do I gain by the whole?

Firſt find the Difference by *Subtraction*, between the Price bought, and the Price ſold for; then by *Practice* caſt up the Number of Yards, by that Difference, as underneath.

s.	*d.*	
10	4	Sold for
8	6	Bought for
1	10	Difference.

220 Yards at 1 *s.* 10 *d.*
6 *d.* | $\frac{1}{2}$ | 110
4 *d.* | $\frac{1}{3}$ | 73 4

40|3 4

Anſwer, *l.* 20 3 4 Total Gain.

Or thus:
220

22
Subtract $\frac{1}{120}$ 1 16 8

l. 20 03 4

Example 2. If a Draper buy 750 Ells of *Holland*, for *l.* 81 5, how muſt it be ſold *per* Ell, to gain *l.* 21 17 6 in the whole? *Anſw.* 2*s.* 9 *d.*

Here the intended Gain muſt be added to the Prime-coſt, which makes *l.* 103 2 6. Then ſay,

If 750 Ells coſt *l.* 103 2 6, what 1 Ell? And the Anſwer will be 2 *s.* 9 *d. per* Ell. And for ſo much muſt he ſell it *per* Ell, to gain *l.* 21 17 6 in the Whole.

And for the Proof, ſee by *Practice* what 750 Ells come to, at 2 *s.* 9 *d.* and you will find it amount to *l.* 103-2-6.

Example 3. Admit a Merchant to buy Goods to the Value of 425 *l.* and offers them again for *l.* 15 *per Cent.* Profit, what come they to? State it thus:

If *l.* 100 gain *l.* 115 what *l.* 425
115
2125
425
425
488|75
20
15|00
Anſw. *l* 488-15

Or thus:
425 at 15 *per Cent.*
4 Hundred under 15 *per Cent.*
60
l. 25 is ¼ of 100 *l.* 3 15, or ¼ of 15 *l.*
l. 63 15 Profit.
Add 425 00 Prime Coſt.
Anſw. *l.* 488 15 What they muſt be ſold for, as before.

Example 4. I buy 500 Pair of Silk Hoſe, at 8 *s.* 6 *d.* *per* Pair, how much muſt I ſell them for *per* Pair, to gain 30 *per Cent.* Profit?

Firſt ſee what they come to at 8 *s.* 6 *d.* *per* Pair thus:

500 Pair at 8 *s.* 6 *d.*
8
4000
6*d.* ½ 250
425|0
Anſw. *l.* 212-10

Then ſee what *l.* 212 10 comes to at 30 *per Cent.*
10 *per Cent.*

21|25 00
20

5|00

l. 21 5 10 *per Cent.*
3

30 *per Ct.* Profit *l.* 63 15 { Anſw.
Prime Coſt, 212 10 { add.

l. 276 05

Then ſay, If 500 Pair coſt *l.* 276 5, what one Pair?
Anſw. 11 *s.* 0 *d.* $\frac{3}{5}$

Example 5. A Half-penny in the Shilling, what is that *per Cent.*

l 100
20

$\frac{1}{2}$)2000 Shillings

12)1000

8|3 4
Anſw. 4-3-4 *per Cent.*

Or thus.
4)100

6)25

l. 4 3 4

A Penny in the Shilling is as much again; 2 *d.* four times as much, 3 *d.* ſix times as much, *&c.* So you may multiply it either by 2, 4 or 6, to know how much you gain *per Cent.* at them Rates in a Shilling, *&c.* Or conſider what part of a Shilling your profit is, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, or $\frac{1}{5}$, *&c.* and take that Part of a 100 *l.* and the Quotient will be what ſuch Profit in a Shilling makes *per Cent.*

Example 6. As ſuppoſe 2 *d.* in the Shilling be your Profit. Two-pence we know is the $\frac{1}{6}$th of a Shilling, wherefore I take the 6th Part of 100 *l.* thus:

6)100 *l.*

Anſw. 16 13 4

In the laſt Example, $\frac{1}{2}$*d.* in the Shilling was *l.* 4 3 4 *per Cent.* where, if you multiply by four, the Halfpence in 2 *d.* you'll find the ſame Anſwer *l.* 16 13 4 Proof. And ſo the contrary.

Again, Admit I gain 3 *d.* $\frac{1}{2}$, or 5 *d.* in the Shilling, what is that *per Cent?*

Here in regard 3 *d.* $\frac{1}{2}$ is $\frac{7}{24}$ and 5 *d.* $\frac{5}{12}$ of a Shilling, I multiply 100 by the Numerator, and divide by the Denominator, according to the 4th Table at the beginning of the Rule of *Practice*; thus:

100 100
3 *d.* $\frac{1}{2}$ in the 1 *s.* 7 Halfpence 5 Pence in the 1 *s.*
(*i. e.* $\frac{5}{12}$
4)700 12)500
6)175 *l.* 41 $\frac{8}{12}$ or $\frac{2}{3}$, *i. e.* 13 *s.* 4 *d.*
Anſw. *l.* 29 $\frac{1}{6}$, or 3 *s.* 4*d.*

As whatever Part of a Shilling is your Profit, the ſame *per. Cent.* will be your Profit alſo: ſo on the Contrary, whatever Part of 100 *l.* is your Profit, the ſame Part of a Shilling will be your Profit likewiſe. As ſuppoſe your Gain be 25 *per Cent.* which is the 4th Part of 100*l.* ſo your Gain in a Shilling will be 3 *d.* at the Rate of 25 *per Cent.* for as 25 is the 4th of 100, ſo is 3 *d.* of 12 *d.*

Example 7. If I propoſe to get in any Goods 20 *l.* *per Cent.* Profit, what is that in a Shilling? 20 *l.* is the 5th Part of 100 *l.* wherefore take the 5th Part of a Shilling for the Profit thus:

5)12 *d.*

2 $\frac{1}{4}$ $\frac{3}{5}$

Example 8. Suppoſe I have goods to the Value of *l.* 415 12 6, that come to a bad Market, and know that they impair by lying, I therefore am obliged to ſell them at 12 *per Cent.* Loſs, what come they to?

Here the Loſs muſt be ſubſtracted from 100 *l.* and the Remainder is the middle Number.

From *l.* 100 If 100 *l.* 88 *l.* what *l.* 415 12 6
take 12 *Anſw.* 365 15 0

88 Loſt in all, *l.* 49 17 6

Or thus: See what *l.* 415 12 6 comes to at 12 *per Ct.* and ſubtract that from the Coſt of Goods.

l. 415 12 6
12

l. 49|87 10 0
20

s. 17|50 From *l.* 415 12 6
12 take 49 17 6

d. 6|00 *Anſw.* *l.* 365 15 0

If *Deal* Boards be bought at 18 *d. per Piece*, and ſold again at 21 *d.* what is that per *per Cent* Profit?

Anſwer, *l.* 16 13 4, thus:
If 18 *d.* gain 3 *d.* what 100 *l.*

If I buy Cinnamon for 6 *s.* 7 *d. per* ℔. and ſell it again for 5 *s.* 9 *d.* what is loſt *per Cent.*

Anſw. *l.* 12 13 1 $\frac{77}{79}$.
If 6 *s.* 7 *d.* loſe 10 *d.* what 100 *l.*

There are two or three other Rules which might be introduced, ſuch as *Alligation*, *Medial* and *Alternate*; and the *Rule of Falſe*; but they being more Amuſement than real Uſe, I ſhall omit them, and, in the next Place, ſay ſomething of *Fractions*.

CHAP.

CHAP. XIX.

Of FRACTIONS, Vulgar and Decimal.

NUMERATION.

I. A *Fraction* is part of a whole Number, and ariſes from *Diviſion*, (as was ſaid before) and hath theſe two Parts, *viz.* *Numerator* and *Denominator*, which have a ſhort line between them, and ſet thus:

Remainder	5	Numerator.
Diviſor	8	Denominator.

The Numerator expreſſes the Number of Parts, and the Denominator giveth to thoſe Parts their Names. As ſuppoſe 277 *l.* be divided among 8 Men, the Quotient will be 34 *l.* the ſhare to each Man; and there will be a Remainder of 5, and muſt be ſet over the *Diviſor* 8 thus $\frac{5}{8}$; and ſignifies that if 1 *l.* or 20 *s.* were divided into 8 Parts, each Man muſt have 5 of thoſe 8 Parts, (or $\frac{1}{2}$ Crowns) more to his Share, as was before hinted.

II. A Vulgar Fraction is either *Simple* or *Compound.*

III. A Simple Vulgar Fraction is that which hath only one Numerator and one Denominator, and is either Proper or Improper.

IV. A proper Fraction hath always its Denominator greater than its Numerator, as $\frac{3}{4}$, $\frac{7}{8}$, $\frac{12}{21}$, *&c.*

V. An Improper Fraction hath its Denominator always leſs than its Numerator, as $\frac{5}{2}$, $\frac{9}{5}$, $\frac{30}{12}$, *&c.*

VI. Compound Fractions conſiſt of divers Numerators and Denominators, and is known by this Particle [*of*] being between them; and are therefore ſometimes called Fractions of Fractions; as $\frac{2}{3}$ of $\frac{5}{6}$ of $\frac{7}{8}$ that is, two thirds of five ſixths of ſeven eighths.

VII. Fractions are of two Kinds, *Vulgar* and *Decimal.*

What *Vulgar* Fractions are, hath been declared already. A *Decimal* Fraction is an artificial Way of expreſſing Vulgar Fractions, by ſetting down the Numerators only; the Denominators being underſtood, but not expreſſed; and is always an Unit, with as many Cyphers annexed as there are Places in the Numerator, and therefore muſt be either 10, 100, 1000, 10000, 100000, *&c.*

VIII. A Decimal Fraction is diſtinguiſhed from a whole Number, by a *Comma*, or Point prefix'd thus, ,5 and ſignifies 5 tenths of an Integer. So the following Fractions are exhibited vulgarly and decimally, *viz.*

	Vulgarly.	Decimally.
7 Tenths	$\frac{7}{10}$	,7
35 Hundredths,	$\frac{35}{100}$	,35
327 Thouſandths,	$\frac{327}{1000}$	,327
64 Ten Thouſandths,	$\frac{64}{10000}$	,0064
108 Hundred Thouſ.	$\frac{108}{100000}$	,00108

In Decimals $\frac{1}{4}$ of any thing is ,25; $\frac{1}{2}$ of *ditto*, is ,5: $\frac{3}{4}$ is ,75.

IX. As whole Numbers increaſe by a Ten-fold Proportion from the Units Place, to the Left Hand; ſo Decimals decreaſe by the ſame Proportion, from Unity to the Right Hand, as may be ſeen in the following Table.

Integers.

Integers.							Decimals.					
Millions	*C. of Thouſands*	*X's of Thouſands*	*Thouſands*	*Hundreds*	*Tens*		*Tenth Parts*	*Hundredths*	*Thouſandths*	*X. Thouſandths*	*C. Thouſandths*	*Millions of Parts*
7	6	5	4	3	2	1	2	3	4	5	6	7
						Units.						
Seventh Place	*Sixth Place*	*Fifth Place*	*Fourth Place*	*Third Place*	*Second Place*		*Primes*	*Seconds*	*Thirds*	*Fourths*	*Fifths*	*Sixths*

Integers, or whole increaſing Numbers. | Decimals, or Fractional decreaſing Numbers.

Here the Figure 2 in the Integers ſignifies 2 Tens, or twice 10 Units; but the Figure 2 in the Decimals, ſignifies but 2, or 2 Tenths of Unity, or one.

X. The Order of Places in whole Numbers is from the Right Hand to the Left; but in Decimals it is from the Left Hand to the Right. So in this Decimal ,456, the Figure 4 ſtands in the firſt Place, and is 4 *Primes*, or 4 Tenths of an Integer; and 5, the ſecond Figure, is 5 Seconds, or Five hundreth Parts of an Integer, *&c.*

XI. Cyphers before Integers, and after Decimals, are of no Value; but after Integers, and before Decimals, they have their Value: For in Integers they increaſe, and in Decimals they decreaſe the Value of the Figure join'd with them. For 4, and 04, and 004, in whole Numbers, is ſtill but four; but in Decimals, 4, by having a Point prefix'd, thus, ,4 is decreaſed from 4 Integers to $\frac{4}{10}$ of an Integer, and ,04 to 4 hundredth Parts of an Integer, *&c.* Again in whole Numbers, 30 is Thirty, and 300 is three hundred; but in Decimals, ,30 or ,300 is ſtill but $\frac{3}{10}$ of an Integer.

Reduction of Fractions, is to bring a Fraction into a common, or into the leaſt Denomination; thereby preparing Fractions to be added, ſubtracted, multiplied or divided.

XII. To reduce Fractions that have unequal Denominators, to Fractions of one common Denominator.

The Rule.

Multiply each Numerator into all the Denominators, (except its own) and take the reſpective Products for new Numerators. *2dly*, Multiply all the Denominators continually; ſo ſhall that Product be a new Denominator, common to all the Numerators found before.

Example.

Reduce $\frac{2}{5}$, $\frac{3}{7}$ and $\frac{8}{9}$ of a Pound to a common Denominator.

The firſt 2	the 2d 3	the 3d 8	Denominator.
7	5	7	5
			7
14	15	56	
9	9	5	35
			9
$\frac{2}{5}\left\{\frac{126}{315}\right.$	$\frac{3}{7}\left\{\frac{135}{315}\right.$	$\frac{8}{9}\left\{\frac{280}{315}\right.$	315 Com. Denominator.

Here I firſt multiply 2 by 7, and the Product is 14, which I multiply by 9, and the Reſult is 126, for the firſt Numerator. Again, I multiply 3 by 5, and the Product is 15, which multiplied by 9, makes 135, for the ſecond Numerator: Then I multiply 8 by 7, and the Product is 56, which multiplied by 5 produces 280, for the laſt Numerator. Laſt of all, I multiply 5, 7, and 9, the ſeveral Denominators together, and their Product is 315, for the common Denominator, to all the Fractions, *See the Work above.*

$$\left.\begin{array}{llll}\text{Reduce } \frac{1}{2}, \text{ and } \frac{5}{8} & & \frac{8}{16} & \frac{10}{16}, \\ \text{Reduce } \frac{7}{11}, \text{ and } \frac{11}{12} & & \frac{84}{132} & \frac{121}{132}, \\ \text{Reduce } \frac{3}{7}, \text{ and } \frac{5}{19} & & \frac{57}{133} & \frac{35}{133}, \end{array}\right\} \textit{Facit.}$$

To prove your Work, divide the new Numerator by the Numerator of the Fraction; and alſo divide the common Denominator by the Denominator of the Fraction, and if both Quotients are alike, the Work is right.

XIII. *Abbreviation*, or how to bring a Fraction into its loweſt Denomination.

The Rule.

Divide both Numerator and Denominator by ſuch a Number as will leave no Remainder in either of them. When the Numerator and Denominator are both even Numbers, they may be reduced by halving, or dividing them by 2.

Example. Reduce $\frac{12}{28}$ into its loweſt Terms, or Denomination.

$$2\left\{\frac{12}{28}\right.\left|\frac{6}{14}\right|\frac{3}{7}\quad\text{Anſwer}\quad\frac{3}{7}$$

Here I ſay the $\frac{1}{2}$ of 12 is 6, and $\frac{1}{2}$ of 28 is 14; and then again the $\frac{1}{2}$ of 6 is 3, and the $\frac{1}{2}$ of 14 is 7: So is the Fraction $\frac{12}{28}$ reduced to $\frac{3}{7}$ its loweſt Terms; and $\frac{3}{7}$ of any thing is equal in Value to $\frac{12}{28}$. Or if you had divided the ſaid Fraction by 4, it had been reduced at once; for the 4's in 12, is 3 times, and the 4's in 28, 7 times, or $\frac{3}{7}$ as before.

When you can no longer halve the Fraction, then divide it either by 3, 4, 5, 6, 7, *&c.* if any of them ſo divide as to leave no Remainder. And after you have diveded by a greater, you may after divide by a leſſer Number, to reduce the Fraction lower ſtill.

Example. Reduce $\frac{84}{168}$ into its loweſt Denomination.

$$\frac{1}{2}\left\{\begin{array}{c|c|c|c|c|c|c|c} & \textit{by} & & \textit{by} & & \textit{by} & & \\ 84 & 2 & 42 & 7 & 21 & 3 & 3 & 1 \\ \hline 168 & 2 & 84 & 7 & 42 & 3 & 6 & 2 \end{array}\right\} \text{ Anſw. } \frac{1}{2}$$

Here I firſt take the $\frac{1}{2}$, or divide it by 2, and then by 2 again; and then by 7, and then by 3, which brings the Fraction into $\frac{1}{2}$, its loweſt Terms.

(3.) If the Fraction, *viz.* Numerator and Denominator end each with a Figure of 5, or a Cypher, or the one with a 5, and the other with a Cypher, divide each of them by 5, and the Quotient will be a new Numerator and Denominator.

Example. Reduce $\frac{55}{80}$, and $\frac{75}{95}$, into their loweſt Terms.

$$5\left\{\begin{array}{c|c} \frac{55}{80} & \frac{11}{16} \end{array}\right\} \text{ Anſwer, } \frac{11}{16}$$

$$5\left\{\begin{array}{c|c} \frac{75}{95} & \frac{15}{19} \end{array}\right\} \text{ Anſwer, } \frac{15}{19}$$

(4.) There is a Way of reducing a Fraction into its loweſt Name by a common Meaſure, which is thus:

Divide the *Denominator* by the *Numerator*, and if any thing remain, divide your laſt *Diviſor* thereby, and if any thing yet remains, divide the foregoing *Diviſor* by it; and ſo you muſt do till nothing remains, and then the laſt *Diviſor* is the common Meaſure required, which will divide both *Numerator* and *Denominator*, without leaving any *Remainder*; and ſo reduce the Fraction into its loweſt Terms at once. But if your laſt *Diviſor* be 1, the Fraction is in its loweſt Name already.

Example. Reduce $\frac{128}{144}$ into its loweſt Terms, by a common Meaſure.

128)144(1
128
———
16)128(8
128
———
(0)

16)128(8
128
———
(0)
16)144(9
144
———
(0)

Here I firſt divide 144 by 128, and there remains 16; by which I divide the laſt Diviſor 128, and there remains (0), wherefore 16, the laſt Diviſor, is the common Meaſure ſought for, and doth divide both Numerator and Denominator, and leaves no Remainder, (as may be ſeen in the Work above) and reduces the Fraction into $\frac{8}{9}$, its loweſt Terms.

But I prefer the other Way, in common Buſineſs, before this latter; for the Time ſpent in finding the common Meaſure, is longer than that ſpent in reducing the Fraction the other Way.

It is very expeditious in many Caſes to work Fractionally, *viz.* to multiply by the Numerator and divide by the Denominator of a Fraction in its loweſt Terms.

Example. What comes a hundred Weight to at 6*d.* $\frac{1}{2}$ *per* Pound? Conſider that $\frac{112}{240}$, in its loweſt Terms, is $\frac{7}{15}$, wherefore multiply 6*d.* $\frac{1}{2}$ by 7, and divide by 15, thus:

6 *d.* $\frac{1}{2}$
7
———
3)45 $\frac{1}{2}$ Rem. $\frac{2}{3}$, or 8 *d.*
5)15
Anſw. l. 3-0-8 *per* C.

Or if you double the Price of a Pound, and multiply by 7 and 8, as follows, you have the Anſwer.

6*d.* ½
s. 1 1
7
7 7
8
Anſw. l. 3 0 8

Or contrariwiſe, you have the Price of a Pound thus:

7)60*s.* 8*d.*
8) 8 8
2) 1 1
6*d.* ½ *Anſwer.*

Any Goods ſold by the Long Hundred in Tale, or 120 to the Hundred, as *Linen*, *Fiſh*, *Deals*, *&c.* being $\frac{120}{240}$, multiply the Price of one by 6, and divide that Product by 12, thus:

Example. *Fiſh* at 3*d.* ½ a Piece.
6
12)21
Anſ. l. 1 $\frac{9}{12}$ or 15*s.*

When things are ſold by the 1000, as *Bricks*, *Tyles*, *Hoops*, *&c.* ſtanding thus. $\frac{1000}{240}$, then multiply the Price of one by 50, and divide by 12, it gives the Price of 1000.

Example. *Oranges* at 2 *d.* a Piece

50
12)100

Anſ. *l.* 8 $\frac{4}{12}$ or 6 *s.* 8 *d.* *per* Thouſ.

$$\left.\begin{array}{r} 12 \\ \hline 50)\ 100\ \ 0\ \ 0 \\ \hline 2\,d.\ \text{a Piece} \end{array}\right\}\ \text{contrary.}$$

Or any thing ſold by the 1000, may be done by multiplying the Quantity by the Price, always cutting off 3 Figures, or Cyphers, towards the Right Hand.

Example. Bought 4796 plain Tiles, at 17 *s.* 6 *d.* *per M.*

17
81532
6 *d.* is $\frac{1}{2}$ of 1 *s.* 2398
83|930
12
4|311|160

Anſ. l. 4-3-11 $\frac{160}{1000}$

This is an eaſy and plain Method.

Again, Sold 45874 Grey Stock Bricks, at 18 *s.* *per M.*

18
82|5,732
12
l. 41-5-8|784
4
3,136

Anſ. *l.* 41-5-8 $\frac{3}{4}$ $\frac{136}{1000}$

I multiply by 18, and it produces 825 *s.* and 732 cut off for 1000, and that multiply by 12, gives 8 *d.* *&c.*

A Fraction is ſeldom abbreviated in Decimals.

XIV. *Valuation.* The Value of a Fraction is found by multiplying the *Integer* by the *Numerator* of the Fraction, and dividing that Product by the *Denominator*. Or contrariwiſe, by dividing by the *Denominator*, and multiplying by the *Numerator*.

Example. What is the $\frac{2}{3}$ of a *l. Sterling?*

20*s.* the Integer.
2 Numerator
3)40
s. 13 4 Anſw.

Contra. 3)20
6 8
2
s. 13 4 Anſw.

What is the $\frac{4}{5}$ of a *Pound?*

20*s.*
4
5)80
16 Anſw.

What is $\frac{12}{28}$ of 20*s.*
$\frac{3}{7}$ its loweſt Terms.
7)60
s. 8 $\frac{4}{7}$ Anſwer

What is $\frac{3}{7}$ of a *C.* Weight?

112 lb. the Integer.
3
7)336
48 lb. Anſwer

Contra. 7)112
16
3
48 lb. Anſwer

What is	$\frac{6}{7}$ of a *l*?	Anſwer, 17*s.* 1 *d.* $\frac{1}{2}$ $\frac{6}{7}$
	$\frac{7}{8}$ of a Shilling?	Anſ. 10*d.* $\frac{1}{2}$
	$\frac{6}{8}$ of a *l.*100 *Sterling*?	Anſ. 75 *l.*
	$\frac{7}{10}$ of a Tun of Wine?	Anſ. 176 $\frac{4}{10}$ Gal.
	$\frac{7}{11}$ of a C. Weight?	Anſ. 71 $\frac{3}{11}$ ℔.
	$\frac{4}{10}$ of a Gallon?	Anſ. 3 $\frac{2}{10}$ Pints
	$\frac{12}{16}$ of a Tun Weight?	Anſ. 15 C.
	$\frac{2}{3}$ of a Foot?	Anſ. 8 Inches
	$\frac{3}{4}$ of a ℔. Weight?	Anſ. 12 *oz.*

Mix'd Numbers.

What is $\frac{4}{6}$ of 12*s.* 6*d*?

$$\begin{array}{rr} & 4 \\ \hline 6)50 & 0 \\ \hline 8 & 4 \end{array}$$

Contra. 6)12*s.* 6*d.*

$$\begin{array}{rr} \hline 2 & 1 \\ & 4 \\ \hline 8 & 4 \end{array}$$

If a Yard of Cloth be worth 8*s.* 10*d.* what $\frac{3}{4}$?

$$\begin{array}{rr} & 3 \\ \hline 4)26 & 6 \\ \hline 6 & 7\frac{1}{2} \end{array}$$ *Anſw.*

If a Ship be worth *l.*946 12 6, what $\frac{4}{32}$ Parts?

$$\begin{array}{rrr} & & 4 \\ \hline 8)3786 & 10 & 0 \\ \hline 4)473 & 06 & 3 \\ \hline l.\ 118 & 06 & 6\frac{3}{4} \end{array}$$ *Anſw.*

XV. If you would know what Part of a Pound any Number of Shillings and Pence is, or what Part of a Tun any Quantity of *C. qrs.* and ℔. is, bring them into to the loweſt Name mentioned; and alſo bring the Integer into the ſame Name, and ſet it for a Denominator; and then bring the Fraction into its loweſt Terms.

Example. What Part of a Pound is 12 *s.* 6 *d*?

20 *s.* the Integer 12
12
——
240

12
——
Numerator, 15|0
——— } Anſwer.
Denominator, 24|0

When there are Cyphers in a Vulgar Fraction at the End, they may be cut off, and you work as if there were none; as in the foregoing Example.

What Part of *C.* Wt. is 71 ℔. $\frac{3}{11}$?

11 112 ℔. the Integer.
—— 11
784 ——
—— 1232
1232

Anſwer, $\frac{784}{1232}$, or $\frac{7}{11}$ in its loweſt Terms.

XVI. *To reduce Vulgar Fractions into Decimals.* Reduction of Decimals is either from common Fractions, or into ſome known Denomination. Therefore to reduce any Vulgar Fraction into a Decimal, to the Numerator of the Fraction, annex 1, 2, 3, 4, 5, or more Cyphers at Pleaſure, and then divide by the Denominator.

Example. Reduce $\frac{3}{4}$ of a *l.* into a Decimal Fraction.

4)300
,75 *Facit*, or 15 *s.*

Here, to the Numerator 3, I annex two Cyphers, and divide by the Denominator, and it quotes ,75; which is equal in Value to $\frac{3}{4}$ of any thing.

If I had annexed 3 Cyphers to the Numerator, the Quotient would then have been ,750, which is ſtill but ,75; for Cyphers on the Right Hand do not increaſe or diminiſh a Decimal, as was ſaid before. Again, Reduce $\frac{2}{3}$ of a *l.* into a Decimal.

3)2000

,666 *facit*, or 13 *s.* 4 *d.*

Reduce 6 *s.* 8 *d.* into a Decimal.

12

8|0|2

24|0|6

6)200

,333 *facit*, or 6 *s.* 8 *d.*

XVII. *Valuation of Decimals.* In Money you muſt account for every *Prime*, or *Unit*, in the firſt Place, 2 Shillings; and for every 5 in the ſecond Place, 1 Shilling, and what is above 5, account ſo many Tens; and the Figure in the third Place, ſo many Units; which Tens and Units are Farthings; but if they exceed $\frac{25}{48}$, there muſt be one Farthing abated.

Example. What is the Value of ,75 *l.* the firſt of the foregoing Examples? *Anſ.* 15 *s.* For the 7 in the firſt Place, I reckon 14 *s.* and for 5 in the ſecond, I account 1 *s.* which put together, make 15 *s.* the Value of the *Decimal Fraction.*

Again, Another *Example* is, ,333: For the firſt 3 I reckon 6 *s.* and for the other two I account 33 Farthings, and abating 1, (becauſe above 25) there reſts 32, or 8 *d.*

What is the Value of ,9749? The firſt Figure 9 being doubled, makes 18 *s.* and the Figure (7) in the ſecond being above 5, I reckon 1 *s.* which put to the 18, makes 19 *s.* and the Exceſs of 7 above 5 being 2, or 2 Tens, makes the next Figure 4 to be 24, which is 24 Farthings, or ſix Pence. So the Decimal Fraction ,9749 is in Value 19 *s.* 6 *d.* *A deciſive Rule.* As often above 13 makes leſs by 1, or above 39 makes leſs by 2.

When you would know the Value of a Decimal in Weight, Meaſure, &c. (as the Value of Decimals in Money may alſo be found) multiply the Decimal by the Parts of the next inferior Denomination, which makes an Integer in the ſame Denomination with the given Decimal; and cut off ſo many Figures towards the Left Hand, as there are Places in the Decimal, and the Figures on the other ſide of the Stroke towards the Left Hand, are the Value of the Decimal, in the next inferior Denomination. And if there be any thing remaining, multiply it by the Parts of the next lower Denomination, &c. And ſo the Fraction may be reduced as low as you pleaſe.

Example. What is the Value of this Decimal of a *C.* Weight, *viz.* ,875 Anſwer $\frac{3}{4}$ 14 lb.

4 *qrs.* 1 *C.*

3|500

28 lb. 1 *qr.*

4000

1000

14|000

Here three Places are cut off towards the Left Hand, becauſe there are ſo many in the Decimal. And thus may the Value of any Decimal be found, whether of Money, Weight, Meaſure, Time, &c.

XIX. To reduce compound Fractions into ſimple ones of the ſame Value.

Rule. Multiply all the Numerators continually for a Numerator, and all the Denominators for a Denominator.

Ex. Reduce $\frac{3}{4}$ of $\frac{5}{6}$ of $\frac{7}{8}$ of a *l.* into a ſimple Fraction.

3	4
5	6
15	24
7	8
Numerator 105	192 Denominator.

Denominat. 192 *Facit.*

Reduce $\frac{9}{10}$ of $\frac{11}{12}$ of $\frac{13}{14}$ of a Tun. $\frac{1287}{1680}$.

XX. To reduce whole or mix'd Numbers into improper Fractions. *Rule.*

(1) If a whole Number is to be reduced into an improper Fraction, ſet the propos'd whole Number for the Numerator, and an Unit, or 1, for the Denominator. Thus 8 Integers may be reduced to $\frac{8}{1}$; or elſe you may aſſign a Denominator to the Integer, and multiply it by the aſſigned Denominator, and the Product will be the Numerator to the ſaid Denominator.

Example. Admit 9 Integers are to be reduced into an improper Fraction whoſe Denominator ſhall be 5: Here I multiply 9 by 5, the propos'd Denominator, and the Product is 45, for a Numerator to the ſaid Denominator 5; ſo is the improper Fraction, $\frac{45}{5}$ equal to 9 Integers.

Reduce 24 into an improper Fraction, whoſe Denominator ſhall be 8.

$$\begin{array}{r}24\\8\\\hline\end{array}$$

$$\left.\frac{192}{8}\right\}\textit{Facit.}$$

(2) If a mixt Number is to be reduced into an improper Fraction. *Rule.*

Multiply the whole Number by the Denominator of the Fraction, and take in the Numerator.

Ex. Reduce 12 $\frac{3}{4}$ Yards into an improper Fraction.

$$\begin{array}{r}4\\\hline\end{array}$$

$$\left.\frac{51}{4}\right\}\textit{Facit}, \text{ equal to } 12\tfrac{3}{4}$$

Again, Reduce *l.* 14 $\frac{7}{8}$ or *l.* 14-17-6 to an improper Fraction.

$$\begin{array}{r}8\\\hline\end{array}$$

$$\left.\frac{119}{8}\right\}\textit{Facit.}$$

XXI. To reduce improper Fractions into whole or mixt Numbers. *Rule.*

Divide the *Numerator* by the *Denominator*, and if it be a mixt Number, what was taken in will remain.

Example. Redue $\frac{119}{8}$ (the foregoing Sum) into its equivalent mixt Number.

8)119

$14\frac{7}{8}$ *Anſ.* Or *l.* 14-17-6

Here the Anſwer is 14 Integers, and $\frac{7}{8}$ of an Integer.

Reduce $\frac{51}{4}$ Yards into a mixt Number.

4)51

$12\frac{3}{4}$ Yards, *Anſwer.*

Reduce $\frac{45}{5}$ into its equivalent whole Number.

5)45

9 *Anſ.* 9 Integ.

XXII. To reduce Fractions from one *Denomination* to another.

(1.) This is either a ſmaller Fraction to be brought into the *Denomination* of a greater; Or,

(2.) A greater into that of a ſmaller.

Example. Reduce 3 *d.* $\frac{1}{2}$ into the Fraction of a *l. Sterl.* Make of it a compound Fraction, thus: Reduce the mixt Number into an improper Fraction, thus, 3 *d.* $\frac{1}{2}$, then ſay, what is $\frac{7}{2}$ of $\frac{1}{12}$ of $\frac{1}{20}$, of a *l.*

Anſ. $\frac{7}{480}$. Or you may ſay, what is $\frac{7}{2}$ of $\frac{1}{240}$? *Anſ.* $\frac{7}{480}$.

Here it being reduced from a compound Fraction, to a ſimple one, according to the 19th Rule of this Chapter, it produces $\frac{7}{480}$, the proper Fraction of a *l.* belonging to 3 *d.* $\frac{1}{2}$.

Reduce $\frac{3}{4}$ of a Penny to the proper Fraction of a *l*. Say $\frac{3}{4}$ of $\frac{1}{12}$ of $\frac{1}{20}$. Or $\frac{3}{4}$ of $\frac{1}{240}$. *Anſ.* $\frac{3}{960}$,

By the ſame Method may be reduced either Weight or Meaſure, *&c.*

When the Fraction is to be brought from a greater to a leſſer Name, then multiply the Numerator by the Parts in the ſeveral Denominations, betwixt that and it, that you would reduce it to.

As ſuppoſe the Reverſe of the laſt Queſtion was aſk'd, *viz.*

What Part of a Penny is the $\frac{3}{960}$ of a *l*.

3
20
———
60
12
———
$\frac{720}{960}$ of 1 *d.* or $\frac{3}{4}$ *Anſ.*

Proof.
720
4
———
3)2880(960

Again, Reduce $\frac{3}{4}$ of a *l.* to the Fraction of a Penny.

3
20
———
60
12
———
$\frac{720}{4}$ *Facit.*

Addition of Fractions.

If the Fractions to be added have a common Denominator, then add all the Numerators together for a Numerator; and place it over the common Denominator.

Example. What is the Sum of $\frac{2}{5}$, $\frac{3}{5}$, and $\frac{4}{5}$ of a *l.*

2
3
4
—
9
—
5

This being an improper Fraction, I reduce it to a mixt Number, and it makes 1 $\frac{4}{5}$, or *l.* 1-16.

Or thus:		Decimally.				Demonſtration.		
$\frac{2}{5}$	,4	$\frac{2}{5}$	,40	$\frac{2}{5}$	is	0	8	0
$\frac{3}{5}$	,6	$\frac{3}{5}$	,60	$\frac{3}{5}$		0	12	0
$\frac{4}{5}$	,8	$\frac{4}{5}$	,80	$\frac{4}{5}$		0	16	0
	1,8		1,80, or *l.* 1-16		*l.*	1	16	0 *Proof.*

Here the vulgar Fraction being reduced to Decimals, according to the 16th Rule of this Chapter, I caſt up the reſpective Decimals, as I do whole Numbers, and the Anſwer is one Integer, and ,8 of an Integer, that is, *l.* 1-16, the 8 Primes being accounted 16*s.* according to the Rule of *Valuation of Decimals*, given in the 17th Rule of this Chapter.

In *Addition of Decimals*, we obſerve the ſame Method as in whole Numbers, only in ſetting down, regard muſt be had that the fractional Parts ſtand one under the other, *viz.* Primes, (or Tenths) under Primes; Seconds under Seconds; Thirds under Thirds, &c. And if mixt Numbers are to be added, then the Fractions to ſtand as before directed, and the whole Numbers to ſtand as in whole Numbers; that is, Units under Units; Tens under Tens, &c. without any regard to the Fractions annexed.

Examples.

Fractions.		Mixt Numbers.
,45	,4	124,97
,5	,574	7,065
,095	,0067	27,5
,225	,56	65,007
1,270	1,5407	224,542

Note, *That ſo many fractional Places that the greateſt hath, among thoſe Numbers that are added, ſo many Places muſt be pointed off from the Total, towards the Right Hand for Decimal Parts; and the other Figures towards the Left Hand are whole Numbers, as in the foregoing Examples may be obſerv'd.*

Again, Add 4 Foot 3 Inches, 6 Foot 9 Inches, and 8 Foot 6 Inches together.

Feet.	Pts.
4	25
6	75
8	50
19	50

Anſw. 19 Foot $\frac{1}{2}$.

More Examples.

Integers.	Parts.
41	426
16	04
36	274
22	8
116	540

Decimal Parts of a *l.*		*s.*	*d.*
,333	or,	6	8
,25		5	0
,75		15	0
,003		0	$0\frac{3}{4}$
,3		6	0
1,636	*l.* 1	12	$8\frac{3}{4}$

SUBTRACTION.

I. As in *Addition*, if the Fractions have unequal *Denominators*, they muſt be reduced to a common *Denominator* before *Subtraction* can be made. They ſubtract one *Numerator* from the other, and place the Difference over the common *Denominator*.

From $\frac{7}{8}$ of a *l.* take $\frac{2}{3}$

Decimally.

,875
,666

,209 Anſ. 4*s.* 2*d.*

$$\begin{array}{ccc} 7 & 2 & 8 \\ 3 & 8 & 3 \\ \hline 21 & 16 & 24 \\ 16 & & \\ \hline \end{array}$$

$$\left.\frac{5}{24}\right\} \text{Anſ. 4s. 2d.}$$

From $\frac{7}{8}$ take $\frac{3}{8}$. Anſ. $\frac{4}{8}$ or $\frac{1}{2}$

Decimally.

,875
,375

Anſw. ,500

From $\frac{11}{16}$ *l.* take $\frac{1}{2}$

$$\frac{16}{8}$$

$$\begin{array}{c} 11 \\ 8 \\ \hline \end{array}$$

$$\left.\frac{3}{16}\right\} \begin{array}{l} \text{Anſw. or} \\ \text{(3s. 9d.} \end{array}$$

Subtraction of Decimals is the ſame as in whole Numbers, obſerving to keep the ſame Order of placing the Numbers as directed in *Addition of Decimals*.

II. To ſubtract a Fraction from a whole Number.

Rule. Subtract the Numerator of the Fraction from the Denominator, and the Remainder place over the given Denominator, for a Numerator; and take a Unit from the whole Number for what you borrowed, and the Remainder place before the Fraction found; which mixt Number ſhall be the Difference ſought.

Example. Subtract $\frac{6}{8}$ from *l.* 25, *facit* 24 $\frac{2}{8}$.

Here 6 from 8 and there reſts 2, which I put over the Denominator 8, thus, $\frac{2}{8}$; then 1 from 25, there reſts 24, which I place before the Fraction $\frac{2}{8}$, thus 24 $\frac{2}{8}$; which is the Difference ſought.

From 12 Ells take $\frac{5}{8}$, *facit* 11 $\frac{3}{8}$.

Decimally. From ,6875 take ,5 of a *l.*

,5000

,1875 Anſ. or 3 *s.* 9 *d.*

Here the Vacancy is ſupplied with Cyphers, or they might have been omitted, and only ſuppoſed to have been there; and if at any Time there ſhould be a Vacancy in the upper Number, it may be ſupplied with Cyphers; or, as aboveſaid, accounted there.

Example. Subtract this Decimal of a *l. viz.* ,75 from this whole Number, 25 *l.*

25,00

,75

24,25 or *l.* 24-5

Here the Defect (tho' not of Places, yet of Number) is ſupplied by annexing Cyphers to the whole Number; for otherwiſe you could not ſubtract ,75 from 25.

III. To ſubtract a mixt Number from a whole Number.

Rule. From the Denominator of the Fraction ſubtract the Numerator, and ſet the Remainder over the Denominator, and then pay one to the whole Number, and ſubtract it from the Integer, and the Remainder is the true Difference ſought.

Example. From 12 *s.* take $5\frac{3}{8}$

$5\frac{3}{8}$ *Decimally.*

12 *s.* . . .

facit $6\frac{5}{8}$ or 6 *s.* 7 *d.* $\frac{1}{2}$ 5 · 375

Anſ. 6 · 625 or 6 *s.* 7 *d.* $\frac{1}{2}$

Again. From 24 Ells take 19 Ells $\frac{3}{5}$

Decimally. $19\frac{3}{5}$

24

19,6 $4\frac{2}{5}$ Anſwer.

4,4 Anſwer.

From 16 *C.* take *C.* $13\frac{7}{16}$ *Decimally.*

$13\frac{7}{16}$ 16, . . .

13,4375

$2\frac{9}{16}$ Anſwer.

2,5625

IV. To ſubtract a mixt Number from a mixt Number.

Rule. (1.) Take the leſſer Numerator from the greater.

Example. From $37\frac{7}{8}$ take $23\frac{5}{8}$.

Decimally $23\frac{5}{8}$

37 · 875

23 · 625 $14\frac{2}{8}$ Anſwer.

14 · 250

(2.) When a greater Fraction is to be taken from a leſſer, then take the Numerator of the greater Fraction from its Denominator, and put the Remainder to the Numerator of the leſſer, which is borrowing an Integer, &c.

Example. Take *C.* $24\frac{12}{16}$ from $35\frac{7}{16}$ *C.* $35\frac{7}{16}$

$24\frac{12}{16}$

Facit, $10\frac{11}{16}$

From *Gal.* 78 $\frac{3}{4}$ take *Gal.* 29 $\frac{2}{3}$. Reduce to a common *Denominator.*

The Fractions $\frac{9}{12}$ and $\frac{8}{12}$, then from 78 $\frac{9}{12}$
take 29 $\frac{8}{12}$

facit 49 $\frac{1}{12}$

MULTIPLICATION.

Rule. I. Firſt multiply the *Numerators* together for a Numerator; and ſecondly, multiply the *Denominators* together for a *Denominator.*

Example. Multiply *l.* $\frac{7}{8}$ by $\frac{3}{4}$ of a *l*
Here 7 times 3 is 21, the Numerator,
And 8 times 4 is 32, the Denominator,

$$\left.\begin{array}{c}21\\ \hline 32\end{array}\right\}\begin{array}{c}\textit{facit},\\ \text{or}\\ 13\text{-}1\,\frac{1}{2}\end{array}$$

Multiplication in whole Numbers increaſes the Product, but in Fractions it decreaſes, that is, makes it leſs than either of the two Numbers alone.

The Reaſon is, becauſe 1 multiplied by 1, is but 1; therefore that which is leſs than 1, being multiplied by that which is leſs than 1, muſt needs be leſſened by *Multiplication.*

In *Multiplication of Decimals*, we proceed as in whole Numbers; only when you have done your Multiplication, you muſt point off from the Product, as many Figures or Cyphers towards the Right Hand, as there are fractional Places in both Multiplicand and Multiplier; and what Figures remain towards the Left Hand, beſide what are cut off, are Integers: But if there are not ſo many Places, ſuch Defect muſt be ſupplied by Cyphers towards the Left Hand.

Example. Multiply the foregoing Sum, *viz.* $\frac{7}{8}$ by $\frac{3}{4}$ Decimally.

$\frac{7}{8}$,875

$\frac{3}{4}$,75

4375

6125

,65625 *Anſw.* 13 *s.* 1 *d.* $\frac{1}{2}$

Here are 5 Decimal Places in both the Fractions, therefore all the Product is pointed off for decimal Parts.

II. When a compound Fraction is to be multiplied by a ſimple one, then reduce the compound Fraction into a ſimple one, according to the 19th Rule in *Reduction of Fractions*, and work as before.

Example. Multiply $\frac{3}{8}$ of a *l.* by $\frac{5}{8}$ of $\frac{3}{4}$ of a *l.* The compound Fraction being reduced, makes $\frac{15}{32}$, which multiplied by $\frac{3}{8}$, produces $\frac{45}{256}$, or 3 *s.* 6 *d.*

When a Fraction, or mixt Number, is to be multiplied by a whole Number, conſtitute a Unit for a Denominator to the whole Number, and then it becomes an improper Fraction; then work as before.

Example. Multiply 24 by $\frac{2}{3}:\frac{24}{1}$ *facit* $\frac{48}{3}$.

Multiply *l.* 12 by $\frac{3}{8}$ of a *l.*

$\frac{12}{1}$ *per* $\frac{3}{8}$ *Anſw.* $\frac{36}{8}$ or 4 *l.* 10 *s.*

Decimally.

,375

12

Facit 4,500 or 4 *l.* 10 *s.*

III. When a mixt Number is to be multiplied by a Fraction, reduce the mixt Number into an improper Fraction, and work as before.

Example. 16 $\frac{1}{2}$ by $\frac{4}{12}$

2

33

2 *per* $\frac{4}{12}$, *facit* $\frac{132}{24}$

Multiply 7 $\frac{1}{4}$ by $\frac{3}{4}$ of a Yard, *facit* $\frac{87}{16}$, or 5 $\frac{7}{16}$ Yards.

Decimally.
7,25
,75
3625
5075
5,4375

IV. To multiply mixt Numbers by mixt Numbers; that is, a whole Number and a Fraction by a whole Number and a Fraction,

Rule. Reduce the given Numbers into improper Fractions, and work as before.

Example. Multiply 120 $\frac{1}{4}$ by 48 $\frac{1}{2}$ 4
4 2 2
$\frac{481}{4}$ 481 $\frac{97}{2}$ 8 *Denom.*
97
3367
4329
Denominator, 8)46657
Anſw. 5832 $\frac{1}{8}$ Feet.

Or thus: Firſt multiply the whole Numbers together; as 120 by 48; and to the Product add $\frac{1}{4}$ of 48, and $\frac{1}{2}$ of 120. *Example.*

120 $\frac{1}{4}$ long.
48 $\frac{1}{2}$ broad.
960
480
60 the $\frac{1}{2}$ of 120.
12 the $\frac{1}{4}$ of 48.
5832 $\frac{1}{8}$ Anſwer.

Decimally.
120,25
48,5
60125
96200
48100
5832,125 Anſwer

Then multiply the Fractions by themſelves, ſaying, once 1 is 1, and twice 4 is 8; which produces the $\frac{1}{8}$. as in the *Example*.

And thus, by either of theſe Ways, having the Length and Breadth of any ſuperficial Quantity, its Content may be found.

Multiply 2 *s.* $\frac{1}{3}$ by 3 *s.* $\frac{2}{4}$
3 $\frac{2}{4}$
6
1
1
Facit, 8 $\frac{2}{12}$, or 8 *s.* 2 *d.*

Or thus (3)
2 4
3 6
7 0
1 2
8 2

Or 2 *s.* 4 *d.* by 3 *s.* 6 *d.*
(2)
Or thus: *s.* *d.*
2 4
3 6
6 0
1 0
1 2
Anſ. 8 2

Decimally
2,333
3,5
11665
6999
8,1655 *Anſ.* 8 *s.* 2 *d.*

The ſecond of theſe Ways is called *Croſs Multiplication* or *Duo-Decimals*, by which Shillings and Pence may be multiplied by Shillings and Pence; or Feet and Inches by Feet and Inches, carrying the ſame from one Denomination to the next; for as 12 Pence make a Shilling, ſo do ſo many Inches a Foot. In the Work I firſt multiply the whole Numbers by themſelves, ſaying 3 times 2 is 6; then croſs-ways, I ſay, 6 times 2 is 12 *d.* or 1 *s.* and 3 times 4 is 12 *d.* or 1 *s.* Then the Pence by the Pence, ſaying 6 times 4 is 24, which I divide by 12, ſaying the 12's in 24, twice, &c.

But the third and beſt Way is wrought *practically*, and the laſt *Decimally*; each Method producing the ſame Anſwer; as may be ſeen in each Work.

Multiply *l.*	3	15	9		*l.* 84	13	6
By		*l.*	4,7,6			*l.*	17,3
	15	3	0		338	14	0 *p.* 4 & 4
2 *s.* 6 *d.* $\frac{1}{8}$		9	5 $\frac{1}{2}$				4
Ditto		9	5 $\frac{1}{2}$		1354	16	0
Ditto		9	5 $\frac{1}{2}$		84	13	6
Facit, l.	16	11	4 $\frac{1}{2}$	2 *s.* $\frac{1}{10}$	8	9	4 $\frac{2}{10}$
				1 *s.* $\frac{1}{20}$	4	4	8 $\frac{1}{10}$
				l.	1452	3	6 $\frac{3}{10}$

By the ſame Method may be multiplied Weight or Meaſure.

DIVISION.

I. If the Fractions are ſingle, and have a common *Denominator*; divide one *Numerator* by the other, and the Quotient is the Anſwer in whole Numbers.

Examples.

Divide $\frac{6}{8}$ by $\frac{3}{8}$, *facit* 2

Divide $\frac{9}{12}$ by $\frac{3}{12}$, *facit* 3

Divide $\frac{27}{32}$ by $\frac{3}{32}$, *facit* 9

II. *Diviſion of Decimals*, is work'd juſt as it is in whole Numbers, only when the Work is over, you muſt point off as many Places from the Quotient, for decimal Parts, as the *Dividend* has more than the *Diviſor*; that is, there muſt be as many decimal Places in the *Diviſor* and *Quotient*, as there are ~~in~~ the *Dividend*; but if not, the Defect muſt be ſupplied by Cyphers being annex'd to the Left Hand of the Quotient, and is juſt the Converſe of Multiplication of Decimals.

III. When the Diviſor conſiſts of more Places than the Dividend, a competent Number of Cyphers muſt be annex'd to the Dividend, before you can make Diviſion.

Example. Let us divide the firſt Sum on the other Side *decimally*; when the Fractions are reduced to Decimals, they make ,75, to be divided by ,375, wherefore I join a Cypher to the Dividend, ,75, thus, ,750, and then divide as in whole Numbers.

,375),750(2
750
(0)

IV. When in Vulgar Fractions, the *Dividend* and *Diviſor* are both ſimple Fractions, then multiply the *Numerator* of the *Dividend* by the *Denominator* of the *Diviſor*, for a *Numerator*; and alſo multiply the *Denominator* of the *Dividend* into the *Numerator* of the *Diviſor*, for a *Denominator*, and the Work is done.

Example.

What is the Quotient of $\frac{4}{5}$ of a *l.* divided by $\frac{3}{4}$ of a *l.*
$\frac{3}{4}$) $\frac{4}{5}$ ($\frac{16}{15}$ Anſwer.

Divide $\frac{12}{14}$ by $\frac{9}{12}$, *Facit* $\frac{144}{126}$, or $\frac{8}{7}$.

Or you may reduce the Fractions to a common *Denominator*, and then divide the new *Numerator* of the *Dividend* by the new *Numerator* of the *Diviſor*.

Example.

Divid $\frac{12}{14}$ by $\frac{9}{12}$, $\frac{144}{168}$, $\frac{126}{168}$.
126) 144 (1 $\frac{18}{126}$ *Anſwer.*

V. To dvide a whole Number by a Fraction, multiply the Integer by the Denominator of the Fraction, and divide by the Numerator.

Example.

Divide 15 Yards by $\frac{3}{4}$

Decimally.
,75)15,00(20
150.
—
(0)

15
4
—
3)60(20 *Anſw.*

VI. To divide a Fraction by a whole Number, let the Numerator ſtand as Numerator, and multiply the Integer into the Denominator for a Denominator.

Example.

Divide $\frac{2}{5}$ of an Ell by 9 Ells, *facit* $\frac{2}{45}$.
Decimally.
9),400(
—
,044 *Anſw.*

VII. To divide a mixt Number by a whole Number, reduce the mixt Number into an improper Fraction, and by its Denominator multiply the Integer for a Diviſor.

Example.

Divide 5 $\frac{3}{4}$ Yards by 4 Yards.
4 4
23 16)23(1 $\frac{7}{16}$, *Anſwer.*
16
4
Decimally. 7
4)5.750

Facit. 1.437

VIII. To divide a mixt Number by a Fraction, reduce the mixt Number into an improper Fraction, and then multiply the Numerator of the improper Fraction, by the Denominator of the Fraction, and the Denominator of the improper Fraction by the Numerator.

Example.

Divide *l.* 12 $\frac{2}{3}$ by $\frac{5}{8}$
3 38
8
38
3 15)304(20 $\frac{4}{15}$ *Anſwer.*
5 3
Decimally.
15 .625)12.666666(20.266 *Anſwer.*

IX. To divide a whole Number by a mixt Number, reduce the mixt and whole Numbers into improper Fractions, and work as before.

Example.

Divide *l.* 48 by 12 ½

$\frac{48}{1}$ — 12 ½ × 2 = $\frac{25}{2}$

48
2
—
25)96($3\frac{21}{25}$ Anſ.
75
—
21

Decimally.
12,5)48,000(3,84 Anſw.

X. To divide a mixt Number, by a mixt Number, bring them into proper Fractions, and work as before.

Example.

Divide 8 ¾ Yards by 5 ½ Yards

4 — 35 — 4   2 — 11 — 2

44)70(1 $\frac{26}{44}$
44
—
26

Decimally.
5,5)8,750(1,59
55..
———
325
275
———
500
495
———
(5)

The Rule of THREE.

Here, as in whole Nnmbers, the firſt and third Numbers muſt be of one Denomination, and as is the Stating, ſo is the Operation the ſame, *viz.* ſecond and third Numbers are multiplied together, and that Product divided by the firſt; according to the foregoing Rules of working Fractions.

Example,

If $\frac{3}{4}$ Yard of Cloth coſt $\frac{4}{5}$ of a *l.* what $\frac{5}{6}$ of a Yard?

$$\begin{array}{ll} \underline{4} & \underline{5} \\ \underline{20} & \underline{30} \end{array}$$

$\frac{3}{4}$)30($\frac{80}{90}$ Anſw. $\frac{8}{9}$ or 17*s.* 9*d.* $\frac{1}{3}$

When the *Numerator* and *Denominator* both terminate with a Cypher or Cyphers, they may be cut off, and the Fraction ſtill retains the ſame Value.

There is another and better Way of working the Queſtion, when it is ſtated, which is thus:

Multiply the *Numerators* of the firſt, into the *Denominators* of the ſecond and third Fractions for a new *Denominator*; and then the *Denominator* of the firſt Fraction into the *Numerators* of the ſecond and third, for a new *Numerator*; which, if an improper Fraction, may be reduced into a whole or mixt Number.

Example.

If $\frac{3}{4}$ Yard coſt $\frac{4}{5}$ *l.* what $\frac{5}{6}$ Yard? *Anſw.* $\frac{8}{9}$ *l.*

$$\begin{array}{ll} \underline{4} & \underline{3} \\ 16 & 15 \\ \underline{5} & \underline{6} \\ 80 & 90 \end{array}$$

Facit $\frac{80}{90}$, as before.

The foregoing Queſtions wrought Decimally.

If ,75 *Yds.* coſt ,8 *l.* what ,833 *Yards?*

$$\begin{array}{r} \underline{,8} \end{array}$$

,75),66640(,888 *Anſw.* or 17*s.* 9*d.*

```
    lb.                     s.        lb.
If 2 3/4 Tobacco coſt 3 1/2 what 242 1/4 ?
    4                       2          4
    —                       —       ————
   11                       7        969
  ———                     ———       ————
    4                       2          4
    7                      11
  ———                     ———
   28                      22
  969                       4
  ———                     ———
  252                      88 Denominator.
 168
252                 27132 )
————               ——————  } Anſwer.
27132 Numerator        88 )

              88)27132(30|8
                   ——————————
                   l. 15 8 3 3/4 Facit.
```

Decimally.

```
      l.              s.          l.
If 2.75——————3.5——————242.25
                           3.5
                       ———————
                       121125
                       72675
                     —————————
               2 75)847.875(30|8 3
                            ——————
                   Anſw. l. 15 8 3 3/4
```

Here the Operation is juſt as it is in whole Numbers.

Before I conclude, I ſhall work ſome Examples in Intereſt by Decimals, by which may be ſeen that the Decimal Way, in ſome Caſes, has the Advantage of the Vulgar.

Simple Intereſt.

Example 1. What is the Amount of a Year's Intereſt of 826*l.* 13*s.* 9*d.* at 5 *per Cent.*

$$\begin{array}{r} 826,687 \\ ,05 \\ \hline 41,33435 \end{array}$$

Anſwer, 41,33435 Or, *l.* 41 6 8 $\frac{1}{4}$ according to the Rule of valuing a Decimal in Reduction of Fractions.

Here the 13*s.* 9*d.* is reduced to the Decimal, ,687, and annexed to the whole Number, 826*l.* with the Decimal Characteriſtick between them; which multiplied by ,05 the Decimal of the Rate, *viz.* 5 *per Cent.* which is found by annexing Cyphers to the Rate, and dividing by 100, thus:

per Cent.
100)500(,05

According to the Way of Valuing the Quotient in Diviſion of Decimals, *viz.* the Quotient muſt have as many Decimal Places as the Dividend exceeds the Diviſor. After the ſame Manner the Decimal for 4 *per Cent.* is found to be ,04, and of 6, ,06, &*c.*

Example 2.

What is the Year's Intereſt of 348 *l.* 13 *s.* 2 *d.* at 6 *per Cent. per Annum?*

l. 348,658 ..
,06

20,91948 Anſw. *l.* 10 18 4 $\frac{1}{2}$

Here there are as many decimal Places ſeparated to the Right Hand, as there are decimal Places to both Multiplicand and Multiplier, according to the Rule of Multiplication in *Decimals* (as in the foregoing Example alſo) and the decimal Parts will be found to be 18 *s.* 4 *d.* $\frac{1}{2}$ according to the Rule of valuing a *Decimal* of Money, *&c.*

Example 3.

What's the Year's Intereſt of

l. 326,——at——4 *per Cent?*
,04

13,04 *Anſw.* *l.* 13 00 9 $\frac{1}{2}$

When the Simple Intereſt of any Sum is required for 2, 3, 4, 5 Years, *&c.* its only to find the Intereſt for 1 Year, and then to multiply that Intereſt by 2, 3, 4, or 5, *&c.*

Example 4.

What's the Intereſt of 324 *l.* 10 *s.* for 4 Years, at 4 *per Cent. per Annum?*

l.
324,5
,04

12,980 *Anſw.* for 1 Year *l.* 12 19 7 $\frac{1}{4}$
Years 4

Anſ. l. 51 18 5

If the Intereſt required be for Parts of a Year, *i. e.* Months, *&c.* take ſuch Parts of the Year's Intereſt, as 6 Months is the $\frac{1}{2}$, 3 Months the $\frac{1}{4}$, and 4 Months the $\frac{1}{3}$, *&c.*

To find the Intereſt of any Sum of Money, for any Number of Days, at any Rate of Intereſt.

Rule. Multiply the Principal by the Rate of Intereſt, and then that Product by the Number of Days, which reſerve for a Dividend (which divided by 365,00 the common Diviſor for all Rates, is the Days of the Year multiplied by 100) anſwers the Queſtion.

Example.

What's the Intereſt of 240 *l.* for 96 Days at 5 *per Ct. per Annum?*
5

1200
96

365,00)1152,00 *Anſw l.* 3 3 0 $\frac{3}{4}$

Likewiſe there may be found Decimal Numbers correſpondent to the Duty or Cuſtom on Tobacco, and *Holland* Cloth, *viz.*

	240 ℔.
1 *d.* per ℔.	1 ℔
5 *per Cent. cut off*	,05
Old Subſidy	,95
2 ½ *per Cent. off*	,02375
New Subſidy	,92625
5 *per Cent. more off the Old, viz.* 7 *d.* ½	,0475
Additional Duty	,87875
⅓ *of the New Subſidy with* 4 *per C. off*	,30875 ,01389375
	,29485625
3 *d. per* ℔.	3,
10 *per Cent. off*	,3
	2,7
8 *per Cent. off*	,216
Impoſt	2,484

And ſo for *Holland* Cloth.

Old Subſidy	,95
New Subſidy	,92625
Addit. Duty	,87875
⅓ *New Subſi.*	,29485625
Impoſt	2,484
Duty of 240 *l.*	5,53385623

So ſome of the Rules of Practice may be work'd by Decimals, but ſhorter by Vulgar Fractions.

AN

APPENDIX.

Containing the Conſtruction and Uſes of

TABLES,

For calculating Queſtions in

COMPOUND INTEREST,

AND,

Annuities or *Leaſes* in *Poſſeſſion* or *Reverſion*.

BELFAST: Printed in the Year, 1762.

Of *Compound Intereſt.*

COMPOUND INTEREST, is that which ariſes from any Principal and it's Intereſt put together, as the Intereſt becomes due, ſo that at every Payment or Time when the Payment becomes due, there is created a new Principal, and for that Reaſon it is called Intereſt upon Intereſt, or Compound Intereſt.

And altho' it be not lawful to let out Money at Compound Intereſt, yet in purchaſing of Annuities, &c. and taking Leaſes in Reverſion it is very uſual to allow Compound Intereſt to the Purchaſer for his ready Money.

In Computations of this kind whether they are about Money forborn at Intereſt, or thoſe relating to Annuities, *&c.* we generally make Uſe of the Amount of a Pound one Year, the Amount of a Pound for a Year at any given Rate of Intereſt *per Cent.* may be found by this Proportion.

As 100 is to 106, ſo is 1 to 1,06, the Amount of a Pound at 6 *per Cent.*

Or, as 100, is to 107, ſo is 1 to 1,07, the Amount of a Pound at 7 *per Cent.* And ſo on for any Rate of Intereſt.

The Conſtruction of Tables, for Calculation of Queſtions in Compound Intereſt and Annuities, or Leaſes in Poſſeſſion or Reverſion.

TABLE

Years	TABLE 1. Shewing the Amount of a Pound for 31 Years at 5 and 6 per Cent. Compound Intereſt.		TABLE 2. Shewing the Rebate of 1 Pound for 31 Years at 5 and 6 per Cent. Compound Intereſt.	
	5	6	5	6
1	1. 050000	1. 060000	. 952381	. 943396
2	1. 102500	1. 123600	. 907030	. 889996
3	1. 157625	1. 191016	. 863837	. 839619
4	1. 215506	1. 262477	. 822703	. 792093
5	1. 276281	1. 338225	. 783526	. 747258
6	1. 340096	1. 418519	. 746215	. 704960
7	1. 407100	1. 503630	. 710683	. 665057
8	1. 477455	1. 593848	. 676839	. 627412
9	1. 551328	1. 689479	. 644609	. 591898
10	1. 628895	1. 790848	. 613913	. 558394
11	1. 710339	1. 898298	. 584679	. 526787
12	1. 795856	2. 012196	. 556837	. 496969
13	1. 885649	2. 132928	. 530321	. 468839
14	1. 979932	2. 260904	. 505068	. 442301
15	2. 078928	2. 396558	. 481017	. 417265
16	2. 182874	2. 540352	. 458111	. 393647
17	2. 292018	2. 692773	. 436296	. 371364
18	2. 406619	2. 854339	. 415520	. 350343
19	2. 526950	3. 025599	. 395734	. 330513
20	2. 653298	3. 207135	. 376889	. 311804
21	2. 785962	3. 399564	. 358942	. 294115
22	2. 925261	3. 603537	. 341849	. 277505
23	3. 071524	3. 819750	. 325571	. 261797
24	3. 225100	4. 048935	. 310067	. 246978
25	3. 386355	4. 291871	. 295302	. 232998
26	3. 555673	4. 549383	. 281240	. 219810
27	3. 733456	4. 822346	. 267848	. 207368
28	3. 920129	5. 111687	. 255093	. 195630
29	4. 116135	5. 418388	. 242946	. 184556
30	4. 321942	5. 743491	. 231377	. 174110
31	4. 538030	6. 088101	. 220359	. 164254

The Conſtructions and Uſes of the foregoing Tables.

The Conſtruction of the firſt Table.

By the Proportion above, find the Amount of a Pound for one Year, which multiply'd by it ſelf, gives the Amount for the ſecond Year, and that Product multiplied by the Amount of a Pound for one Year, gives the Number for the third Year; and ſo multiplying the Amount for every precedent Year, by the Amount of a Pound for one Year, the Product will be the Amount for every following Year, till the whole Table be finiſhed.

But the moſt expeditious Method, is by the Logarithms thus: Find the Logarithm of the Amount of a Pound for a Year, and add that Logarithm to itſelf, the Sum is the Logarithm of the Number belonging to the ſecond Year, and to that Sum add again the Logarithm of the Amount, gives the Logarithm of the Number belonging to the third Year, and thus adding the Logarithm of the Amount of a Pound for a Year, to the Logarithm of the Amount for any Precedent Year, that Sum will be the Logarithm of the Number belonging to the following Year, till the whole Table be finiſhed.

The Conſtruction of the ſecond Table.

Divide Unity (or the Number 1) by the Numbers in the firſt Table, and the Quotients will be the Correſponding Numbers in the ſecond Table.

As for Example. Under 5 *per Cent.*

$$1 \text{ Divided by} \left\{\begin{array}{c}1.050000\\1.102500\\1.157625\\ \&c.\end{array}\right\} \text{will give} \left\{\begin{array}{c}.952381\\.907030\\.863837\\ \&c.\end{array}\right.$$

After the ſame Manner the Numbers at 6 *per Cent.* were ſound.

The

The Uſe of the firſt Table.

What Sum will 567 *l.* 10 *s.* Amount to in 9 Years, at the Rate of 6 *l.* *per Cent.*

In the firſt Table under 6 *per Cent.* and over againſt

9 Years is 1,689479

Which multiply'd by 567,5

8447395

11826353

10136874

8447395

l. *s.* *d.*

The Product is 958,7793325 Which is equal to } 958 15 7

The Uſe of the ſecond Table.

What ready Money will pay a Debt of 46 *l.* 10 *s.* due 22 Years hence, at 6 *per Cent.*

In the 2d Table under 6 *per Cent.* and over againſt

22 Years is ,277505

Multiply'd by 46,5

1387525

1665030

1110020

l. *s.* *d.*

The Prod. is 12,9039825 Equal to 12 18 0$\frac{3}{4}$

TABLE 3.

A TABLE ſhewing the Amount of one Pound Annuity forborn thirty one Years, at 5 and 6 per Cent.

Years	5	6
1	1. 000000	1. 000000
2	2. 050000	2. 060000
3	3. 152500	3. 183600
4	4. 310125	4. 374616
5	5. 525621	5. 637093
6	6. 801913	6. 975381
7	8. 142008	8. 393837
8	9. 649108	9. 897647
9	11. 026564	11. 491315
10	12. 577892	13. 108794
11	14. 206787	14. 971642
12	15. 917126	16. 869940
13	17. 712982	18. 882137
14	19. 598631	21. 015165
15	21. 578563	23. 275969
16	23. 657491	25. 672527
17	25. 840366	28. 212879
18	28. 132384	30. 905651
19	30. 539003	33. 759990
20	33. 065954	36. 715590
21	35. 719251	39. 992725
22	38. 505214	43. 392289
23	41. 430475	46. 995826
24	44. 501999	50. 815575
25	47. 727099	54. 864510
26	51. 113453	59. 156381
27	54. 669126	63. 705763
28	58. 402583	68. 528100
29	62. 322712	73. 639796
30	66. 438847	79. 058184
31	70. 760790	84. 801675

The Conſtruction and Uſe of this Table is as follows.

Its CONSTRUCTION.

Divide each of the given Numbers of the firſt Table leſs by Unity by the Amount of a Pound for a Year (leſs by Unity) and the Quotients will give the Numbers in this Table.

Thus { .05 / .1025 / .157625 / &c. } Which are the Numbers for the firſt 3 Years leſs by Unity.

Divided by .05 the Amount of a Pound leſs by Unity, the Quotients will be { 1. / 2.05 / 3.1525 / &c. } The Numbers for the firſt 3 Numbers in this Table.

After the ſame Manner the whole Table may be conſtructed.

The Uſe of the foregoing Table.

I demand what an Annuity of 46*l.* 12*s.* 6*d.* will amount to, forborn 9 Years at 5 *per Cent.*

In the 3d Table oppoſite 9 Years, and under 5 *per Cent.* is 11,026564

Multiply'd by 46,625

$$\begin{array}{r} 55132820 \\ 22053128 \\ 66159384 \\ 66159384 \\ 44106256 \\ \hline \end{array}$$

The Prod. is 514,113546500 Equal to 514 *l.* 2 *s.* 3¼ *d.*

Table 4.

Years	TABLE 4. Shewing the Preſent Worth of one Pound Annuity to continue for 31 Years, at 5 and 6 per Cent.		TABLE 5. Shewing what Annuity to continue for 31 Years will purchaſe at 5 and 6 per Cent.	
	5	6	5	6
1	0. 952381	0. 943396	1. 050000	1. 060000
2	1. 859410	1. 833392	. 537805	. 543637
3	2. 723248	2. 673012	. 367208	. 374110
4	3. 545950	3. 465105	. 282012	. 288591
5	4. 329477	4. 212363	. 230952	. 237396
6	5. 075692	4. 917324	. 197017	. 203363
7	5. 786373	5. 582381	. 172820	. 179135
8	6. 463212	6. 209792	. 154722	. 161036
9	7. 107821	6. 801691	. 140691	. 147022
10	7. 721734	7. 360086	. 129505	. 135868
11	8. 306414	7. 886873	. 120389	. 126793
12	8. 863251	8. 383843	. 112825	. 119272
13	9. 393572	8. 852682	. 106456	. 112960
14	9. 898640	9. 294983	. 101023	. 107585
15	10. 379658	9. 712248	. 096342	. 102963
16	10. 837769	10. 105894	. 092270	. 098952
17	11. 274065	10. 477258	. 088699	. 095445
18	11. 689586	10. 827602	. 085546	. 092356
19	12. 085320	11. 158115	. 082745	. 089621
20	12. 462209	11. 469920	. 080242	. 087184
21	12. 821155	11. 764075	. 077996	. 085004
22	13. 163002	12. 041580	. 075970	. 083045
23	13. 488573	12. 303377	. 074137	. 081278
24	13. 798641	12. 550356	. 072441	. 079679
25	14. 093944	12. 783354	. 070952	. 078227
26	14. 375184	13. 003164	. 069564	. 076904
27	14. 643033	13. 210531	. 068292	. 075697
28	14. 898127	13. 406162	. 067122	. 074592
29	15. 141073	13. 500719	. 066045	. 073579
30	15. 372450	13. 764829	. 065051	. 072649
31	15. 592810	13. 929084	. 064132	. 071702

The Conſtruction of the Fourth Table.

Divide each Number of the Third Table by the Number correſponding in the ſame Year in the Firſt Table, their reſpective Quotients will give the Numbers correſponding to the ſame Years in this Table.

Thus	Divide by	Will give
1.000000	1.050000	0.952381
2.050000	1.102500	1.859410
3.152500	1.157625	2.723248
&c.	&c.	&c.

The Conſtruction of the Fifth Table.

Divide Unity by the Numbers in the Fourth Table, the Quotients will be the Numbers in the Fifth Table.

The Uſe of the Fourth Table.

Example 1.

Suppoſe a Leaſe of 250 *l. per Annum*, were to be let for 21 Years; what may the preſent Worth of that Leaſe be, at the Rate of 5 *per Cent.*

Multiply the Number under 5 *per Cent.* and over againſt 21 Years, *viz.* 12.821155

By 250

641057750

25642310

l. s. d.

Product 3205.288750 Equal to 3205 5 $9\frac{1}{4}$

Example 2.

There is a Leaſe of Lands worth 32 *l. per Annum* more than the Rent paid to the Lord; of which Land there is yet a Leaſe in Being for 7 Years; and the Leſſee is deſirous to take a Leaſe in Reverſion for 21 Years, to begin when his old Leaſe is expired. What Sum of Money is to be paid for this Leaſe, allowing Intereſt at the Rate of 6 *per Cent.*

Firſt, See what this Rent of 32 *l.* is worth for 7 Years, which will be 178 *l.* 12 *s.* 9 *d.*

Secondly, Add 7 Years to 21 Years, which makes 28 Years; then ſee what 32 *l.* to continue 28 Years is worth, which will be 428 *l.* 19 *s.* 11 *d.* ½.

Laſtly, Subtract the preſent Worth for 7 Years, from the preſent Worth for 28 Years, the Difference is the Anſwer to the Queſtion, to wit, 250 *l.* 7 *s.* 2 *d.* ½

The Work for 7 Years,	For 28 Years.
5,582381	13,406162
32	32
11164762	26812324
16747143	40218486
178,636192	428,997184

From 428,997184
Take 178,636192

			l.	*s.*	*d.*
Product	250,360992	Equal to	250	7	2 ½

The Uſe of the Fifth Table.

What Annuity or yearly Rent, to continue 22 Years, may be purchaſed for 965 *l.* 10 *s.* at the Rate of 6 *per Cent. per Annum.*

In Table Five, over againſt 22, and under 6 *per Cent.* is ,083045
Multiplied by 965,5

415225
415225
498270
747405

			l.	*s.*	*d.*
Product	80,1799475	Equal to	80	3	7

The

The Application of the foregoing Tables, to find the preſent Worth in Reverſion.

Example.

There is one who has nine Years to come in a Leaſe of 175 *l. per Annum*, and he is deſirous to enlarge his Time 11 Years more, (*viz.* to enjoy it 20 Years to come;) what ſum muſt be given in ready Money for that Purchaſe, allowing the Rate of 6 *per Cent.* to the Purchaſer.

The firſt Work in this Queſtion, is to find the preſent Worth of 175 *l.* to continue 11 Years, at 6 *per Cent.*

over-againſt 11 Years is 7,886873
Multiply by 175

39434365
55208111
7886873

1380,202775

Then by the Second Table find the Rebate for 9 Years, which will be the Sum required.

In the 2d Table at the Rate of 6 *per Cent.* oppoſite

to 9 is ,591898
Multiply'd by 1380,2

1183796
47351840
1775694
591898

			l.	*s.*	*d.*
Product	816.9376196	Equal to	816	18	9

To conclude this TREATISE, I ſhall here lay down the Practice of *croſs Multiplication*, as it is commonly made uſe of in the Meaſure of *Maſon* and *Carpenter* Work.

As the *French* divide their Inch into twelve Lines, ſo our Maſons, in meaſuring their Work, ſuppoſe the Inch divided into twelve equal Parts, which we ſhall likewiſe call Lines: So the Meaſure, upon which our Calcul depends, ſtands thus:

Lineal, or *Length-meaſure.*

12 lines	are	1 inch
12 inches		1 foot
3 feet		1 yard
6 yards		1 rood

Superficial Meaſure.

144 lines	are	1 inch
144 inches		1 foot
9 feet		1 yard
36 yards		1 rood

Solid Meaſure.

1728 lines	are	1 inch
1728 inches		1 foot
27 feet		1 yard
216 yards		1 rood

The *ſuperficial content* of any *rectangular quadrilateral* figure, is found by multiplying the length by the height or breadth; and that of a *right-angled Triangle* is found by multiplying the baſe by ½ the height.

Solid Meaſure is found by multiplying the ſurface by the thickneſs.

The lengths, breadths and thickneſſes, are taken in lineal feet, inches and lines; ſo the whole calcul of the *contents* is performed by a *croſs Multiplication* of feet, inches and lines, by feet, inches and lines.

Example 1. In an area, paved with free ſtone, in length 22 feet 4 inches, and in breadth 19 feet 7 inches, how many ſquare feet?

Anſwer, 437 feet, 4 inches, 4 lines.

Here I multiply my 22 feet in the *Multiplicand*, by 19 feet in the *Multiplier*, and I have 418 ſquare feet; then I multiply 19 feet into 4 inches in the *Multiplicand*, the *Product*, 76, affords 6 twelves, or 6 feet, 4 inches.

Next, I multiply 7 inches in the *Multiplier* into 22 feet in the *Multiplicand*, the *Product*, 154, affords 12 feet, which I ſet down under feet, and the remaining 10 inches I ſet under inches; then I multiply 7 inches into 4 inches, the *Product*, 28, gives 2 inches,

F.	*in.*	*l.*
22	4	0
19	7	0
418	0	0
6	4	0
12	10	0
	2	4
437	4	4

ches, which I ſet down under inches, and the remaining 4 ſet in the place of lines; theſe added, give the *Anſwer* 437 feet, 4 inches, 4 lines.

If I would reduce this *Product* to yards, I divide my 437 feet by 9, the number of ſquare feet in a ſquare yard, as in the margin, and have my area, 48 yards, 5 feet, 4 inches, 4 lines.

F.	*in.*	*l.*	
9)437	4	4	
yds.	*f.*	*in.*	*l.*
48	5	4	4

If I would reduce theſe 48 yards to roods, I divide by 36, the number of yards in a rood, and find my area to be 1 rood, 12 yards, 5 feet, 4 inches, 4 lines.

36)48(1 *rood.*
36
—
12 *yards.*

Example 2. In a floor 49 feet, 7 inches, 4 lines long, and 26 feet 6 inches broad, how many ſquare feet?

Anſwer, 1314 feet, 8 inches, 4 lines.

Here, as in the former *Example*, I firſt multiply my 26 feet into the whole *Multiplicand*, and then my 6 inches into the whole *Multiplicand*.

In multiplying my 26 feet into 4 lines, the *Product*, 104, affords 8 twelves, or 8 inches, and 8 lines, and in multiplying my 6 inches into 4 lines, the *Product*, 24, affords juſt 2 lines.

F.	*in.*	*l.*
49	7	4
26	6	0
1274	0	0
15	2	0
0	8	8
24	6	0
	3	6
		2
1314	8	4

Example 3. In a piece of timber, whoſe length is 17 feet 6 inches, breadth 1 foot 11 inches, and thickneſs 2 feet inches, how many ſolid feet?

Anſwer, 86 feet, 7 inches, 9 lines ½.

F.	in.	l.	
17	6	0	
1	11	0	
17	6	0	
15	7	0	
	5	6	
33	6	6	
2	7		
66	0	0	
1	0	0	
0	1	0	
19	3	0	
00	3	6	
00	0	3	6
86	7	9	6

Here I firſt multiply my length, 17 feet, 6 inches, by 1 foot 11 inches of breadth, and find the *ſuperficial* meaſure of the baſe of my *ſolid* to be 33 feet, 6 inches, 6 lines, which I multiply by the thickneſs, 2 feet 7 inches, and find the *ſolid content* to be 86 feet, 7 inches, 9 lines; for the Fraction of the line may be neglected.

Let theſe three *Examples* ſuffice to illuſtrate and explain the uſe and practice of *croſs Multiplication* in the menſuration of *Surfaces* and *Solids*. Mean time, I could heartily wiſh, that theſe Gentlemen, who have daily occaſion for that kind of meaſure, would rather chooſe the *decimal* way of working, as being fully as expeditious, and leſs liable to miſtakes, eſpecially conſidering in our rulers of foot-meaſure the inch is divided, not into twelve, but ten equal parts, which naturally introduces the *decimal* way. And I muſt here take notice, that, in working *decimally*, we have real ſolid inches, or 1728th parts of a ſolid foot; and in ſuperficial meaſure we have real ſquare inches, or 144th parts of a ſquare foot; whereas, in working by croſs *Multiplication*, we have only 12th parts of a ſolid foot, which we call inches, and only 12th parts of a ſquare foot, which we call ſquare inches.

FINIS.